Examining Professional Learning to Support Educators' Design, Implementation, and Evaluation

of Functional Assessment-Based Interventions

By

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Abstract

This dissertation offers a collection of works examining team-based approaches to functional assessment-based interventions (FABIs) in schools, with an emphasis on practice-based professional development. Across chapters, we offer (a) a statement of the problem (Chapter 1), (b) a systematic review examining the extent literature on training in-service educators and other school-site personnel in functional approaches to assessment and intervention (Chapter 2), (c) a study examining pre and post training outcomes of school site teams who were randomly assigned to either university led or state technical assistance led professional learning on FABIs (Chapter 3), (d) a conceptual paper examining how schools have and are adopting and implementing FABIs (Chapter 4), and (e) a discussion and final forum synthesizing overall findings and considerations for future research and practice (Chapter 5).

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Dedication

To all educators everywhere, dedicated to supporting the multiple needs of all students. To my parents, committed lifelong learners who have dedicated their careers to supporting public education. To my advisor, Kathleen Lynne Lane as well as my close mentor Wendy Peia Oakes for absolutely <u>everything</u>.

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Chapter 1:

Statement of the Problem

Functional assessment-based interventions (FABI) are supports for students with the most intensive intervention needs (Umbreit, Ferro, Liaupsin, & Lane, 2007). During the past 60 years, researchers have used functional assessment data to develop various methods to identify maintaining variables of problem behavior. Skinner (1953) first used the term *functional analysis* to conceptualize experimental manipulations of environmental variables to demonstrate cause-effect relations between environmental variables and behavior. Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) developed a systematic experimental method coined experimental functional analysis to determine the maintaining variables of behavior prior to treatment selection. Early work in clinical settings (Aylonn & Michael, 1959; Iwata et al., 1982/1994; Lovass, Freita, Gold, & Kassorla, 1965) as well as theoretical work (Carr, 1977) extended functional approaches to applied settings (Dunlap, Kern-Dunlap Clarke, & Robbins, 1991; Lennox & Miltenberger, 1989; Repp, Felce, & Barton, 1988), including educational settings (Weeks & Gaylord-Ross, 1981).

Functional Assessment

Today, the term *functional assessment* is more aptly used to describe any functional approach to assessment to identify a functional relation between one or more behaviors and one or more environmental events (Kates-McElrath, Agnew, Axelrod, & Bloh, 2007). Functional assessment procedures can be classified into two types: (a) descriptive methods (i.e., direct assessment, indirect assessment), and (c) experimental methods (experimental functional analysis; Neef & Peterson, 2007; see Figure 1).

Descriptive procedures. Descriptive procedures employ indirect and direct methods. Direct assessment methods gather information to identify the function(s) of problem behaviors and events that predict their occurrences. These methods involve direct observation of the target behavior under specified antecedent and consequences. These procedures include: scatterplot assessment (Touchette, McDonald, & Langer, 1985) and A-B-C assessment (Cooper, Heron, &

Heward, 2007). In contrast, indirect assessment methods gather information about what evokes the target behavior and the maintaining consequences. These procedures include behavioral interviews, behavior rating scales, checklists, and questionnaires (Cooper et al., 2007; Dunlap et al., 1993; Kern, Dunlap, Clarke, & Childs, 1994).

Experimental procedures. Experimental procedures (i.e., functional analysis) involve one or more test conditions and one control condition to directly observe and measure one or more target behaviors (Iwata & Dozier, 2008). These procedures include potential reinforcement contingencies (i.e. escape, tangible, attention, and automatic) for the test conditions and a control condition (i.e. potential reinforcement contingencies are absent, such as free play) which are respectively tested in isolation using an alternating treatment/multi-element design (Birnbrauer, Peterson, & Solnick, 1974). The condition with the highest levels of problem behavior suggests a functional relation between the environmental variable manipulated in that test condition and the target behavior. Functional analysis can employ traditional (i.e., duration or latency) or trial-based procedures.

***Traditional functional analysis*.** Traditional FA procedures were initially developed by Iwata and colleagues (1982/1994). In traditional FA procedures, each condition is generally 10 min in length and conducted in a controlled setting (e.g., clinic or somewhere outside of the student's classroom). Test conditions (e.g., social attention, tangible, demand, ignore) and control conditions (e.g., toy play) are alternated and employ an alternating treatment design. Sessions are conducted until a pattern of responses emerges clearly enough to discern function. Data are collected and graphed to display the rate of maladaptive behavior and the total length of session time (LaRue et al., 2010).

***Trial-based functional analysis*.** Trial-based functional analysis (TBFA) procedures were initially developed by Sigafoos and Saggers (1995). In TBFA procedures, each condition is tested in a trial, which lasts 1 to 2 min in length and are conducted in the natural environment (e.g., the classroom). Similar test and control conditions are selected, as in traditional FA, and again an alternating treatment design is used to discern a clear pattern of responding. Each trial consists of a motivating operation present (MO present) and a motivation operation absent (MO absent) phase. The MO present phase (e.g., deprivation of attention, restricted access to tangibles, presentation of demands) is generally 1 min in length if no target behavior occurred. The MO present phase ends (and the MO absent phase begins) upon the first occurrence of the target behavior. Data are collected on presence/absence of behavior in the different trials (MO present/ MO absent), the latency to the first target behavior, and the total length of session time (LaRue et al., 2010).

Function-based behavior intervention plan. Conclusions drawn from functional assessment data are used to drive the design and implementation of function-based behavior intervention plans (BIP). In brief, BIPs are behavior change strategies based on the reason(s) for challenging behavior (i.e., function; such as access to adult attention, access to preferred tangible/activity, or escape from a task). Function-based interventions use information gathered from the functional assessment to decrease a target behavior and/or increase a replacement behavior. Specifically, functional assessments identify *antecedents* (A) setting the stage for target *behavior(s)* (B) to occur, and the *consequences* (C) the target behavior. An intervention is then designed that will teach the student functionally-equivalent replacement behaviors as a new way of meeting his or her needs (although in some cases the replacement behavior does not serve the same function as the target behavior; see Umbreit et al., 2007). Behavior change tactics include (a) preventing challenging behavior by adjusting antecedent conditions, (b) teaching replacement behaviors, (c) reinforcing appropriate alternative behaviors, and/or (d) extinguishing (i.e., reducing reinforcement for) challenging behaviors.

Behavior interventions derived from the function of behavior are more likely to result in significant, desirable, long-term changes in student behavior (Filter & Horner, 2009; Ingram, Lewis-Palmer, & Sugai, 2005). Intervention planning decisions that are not based on function, or inaccurate interpretations of functional assessment data, can lead to the selection of ineffective or less-effective interventions, and even possibly interventions that exacerbate problem behaviors (Iwata, Pace, Cowdery, & Miltenberger, 1994).

Functional Assessment-based Interventions

Functional approaches to assessment and intervention were initially developed in clinical settings. Iwata and colleagues (1982/1994) developed the first systematic methodology for determining the maintaining variables (e.g., functions) of behavior in highly-controlled clinical settings. Iwata and colleagues measured the occurrence of self-injurious behavior (SIB) in 15 min sessions, which included three test conditions to determine whether the SIB was maintained by (a) social positive reinforcement (e.g., attention), (b) social negative reinforcement (e.g., escape), or (c) automatic reinforcement (e.g., sensory reinforcement or pain attenuation). A control condition was designed to account for all variables manipulated during the three test conditions, for a total of four conditions. Following repeated exposure across conditions, results were used to determine the probable function of SIB associated with the condition displaying the highest levels of SIB. Iwata and colleagues demonstrated participants' problem behaviors predictably increased and decreased based upon the alteration of specific contingencies derived from the identified function.

In additional to experiments to study functional approaches, advances were also made using indirect and direct observation. Lennox and Miltenberger (1989) described advances in functional assessment, employing indirect and direct observation assessment tools for conducting functional assessment. Indirect methods included behavioral interviews, rating scales, checklists, and questionnaires. Direct assessment methods included observation of the target behavior under specified antecedent and consequent conditions, scatterplot assessment, and A-B-C assessment (Cooper et al., 2007; Touchette et al., 1985). A-B-C assessment can be used to directly observe the operant contingencies in play by identifying antecedents (A) which set the stage for target behaviors (B) to occur and the consequences (C) maintaining their future probability of occurring. Scatterplot assessment data are used to create graphic displays to identify temporal conditions that may reliably predict the occurrence or absence of target behaviors. Descriptive procedures, including indirect and direct methods are sufficient across many applied and research-based contexts to hypothesize the function of a challenging behavior. However, there are situations in which experimental assessment methods may be used, following the descriptive functional assessment, to confirm its hypotheses (Rispoli et al., 2015). For example, information obtained from descriptive methods can provides an empirical basis for formulating hypotheses regarding function of behavior (Lalli & Goh, 1993). After hypotheses have been developed, experimental functional analysis can be conducted to test established hypotheses (Neef & Peterson, 2007). However, indirect and direct procedures alone have been found to lead to appropriate and effective treatments (Gage, Lewis & Stichter, 2012; Lalli, Browder, Mace, & Brown, 1993; Lane, Eisner et al., 2009).

Functional Approaches to Assessment and Intervention

In 1997, the federal reauthorization of the Individuals with Disabilities Education Act (IDEA) first specified requirements for when Individual Education Plan (IEP) teams were required to implement functional assessment and behavior intervention plans (BIP) tied to the function(s) of challenging behavior. It also specified identify behavioral function as an expected professional practice when developing behavior interventions in special education. The current reauthorization of IDEA (2004) requires functional assessment and BIPs for students with disabilities upon a disciplinary change in placement when the conduct in question is a manifestation of the student's disability (§ 1415[k][1][F][i]–[ii]). Whereas, for disciplinary changes deemed unrelated to a student's disability, the requirement is conditional—only applied "as appropriate"—and the 2004 amendments changed the BIP element to the more general language of "behavior intervention services and modifications" (§ 1415[k][1][D][ii]; Collins & Zirkel, 2017). IDEA (2004) further stipulates when behavior of students who are receiving special education impedes their own learning or the learning of others, the IEP team may "consider the use of positive behavioral interventions, strategies, and supports, and other strategies to address that behavior" (§ 1414[d][3][B][i]). The 2006 regulations that the Department of Education issued to implement the 2004 amendments repeated the 2004 IDEA requirements without elaboration or addition, and reversed the 1999 regulations issued to implement the 1997 amendment by eliminating the requirements for an "assessment plan" for a functional assessment and BIP upon the 10th disciplinary removal cumulatively within a school year (Collins & Zirkel, 2017).

IDEA and its subsequent regulations were intended to align school policies with best practices in behavioral treatments. Functional approaches to assessment and intervention were mandated to aid in explaining why a challenging behavior occurs, rather than using interventions to simply suppress undesired behaviors. Functional approaches to assessment may include a range of *indirect* tools (e.g., teacher, student, and parent interviews, or rating scales); *direct* tools (e.g., direct observation, scatterplot assessment, and A-B-C assessment); and *experimental analyses* (e.g., FA). To date, IDEA does not define (a) which procedural components qualify as functional assessment, (b) what categories of professionals should be trained in and implement functional assessment-based interventions, or (c) what the qualifications are for alignment between the functional assessment results and the drafting and implementation of the BIP (Collins & Zirkel, 2017).

Functional assessment-based intervention: The Umbreit Model

Umbreit and colleagues (2007) developed a systematic approach for practitioners to use in authentic settings (e.g., classroom) to aid in identifying the maintaining function(s) of target behaviors and in designing interventions which are directly linked to the results of the functional assessment. However, there are many variations in methods for conducting functional assessment and writing BIPs. The Umbreit model includes unique features to assist practitioners in the design, implementation, and evaluation of FABIs in a range of settings. These tools include *Function Matrix*, *Function-Based Intervention Decision Model*, and *Antecedent-Reinforcement-Extinction (A-R-E) Components*.

Function Matrix. The function of a behavior is found in the consequence(s) that positively or negatively reinforce it. The Function Matrix is a tool used to analyze functional assessment data related to those consequences to determine the hypothesis statement, which describes the function of the problem behavior. Researchers and practitioners should identify whether challenging behaviors are maintained by positive reinforcement (access) or negative reinforcement (avoidance), with individuals seeking or avoiding: (a) attention, (b) activities or tangibles, and/or (c) sensory stimuli. Some behaviors are maintained by a single function (e.g., access attention), while other behaviors serve multiple functions (e.g., access attention *and* escaping non-preferred activities). Researchers and professionals should identify the specific consequence(s) that is/are being accessed or avoided. The Function Matrix is a graphic organizer for information gathered during the functional assessment to analyze the data collected to aid in this process. The hypothesis statement as to why the behavior is occurring is made based on where the predominance of data is located within the Function Matrix.

Function-based Intervention Decision Model. Another unique feature is the Function-Based Intervention Decision Model, which is a tool used to select the intervention focus. Two key questions are asked and answered to guide the appropriate selection of one of three intervention methods or one hybrid method. These questions are: *Can the student perform the replacement behavior*, and *Do antecedent conditions represent effective practices.* Method 1 is *Teach the Replacement Behavior.* This is used when the replacement behavior is not in the student's repertoire (acquisition deficit). Method 2 is *Improve the Environment*, and is used when the student has the replacement behavior in his or her repertoire, yet the antecedent conditions preceding the behavior may not offer the most effective conditions for preventing the target behavior and/or eliciting the replacement behavior. Method 3 is *Adjust the contingencies*, and is used when the replacement behavior is in the student's repertoire and antecedent conditions represent sufficiently effective practices. In this case, shifts to decrease the rate of reinforcement for the target behavior and to increase the rate of reinforcement for the replacement behavior are needed. Lastly, there is a combination of Methods 1 and 2, which focuses on *Teaching the Replacement Behavior and Improving the Environment.* Based on function and method, each intervention includes ARE components: antecedent (A) adjustments, reinforcement (R) adjustments, and extinction (E) procedures. These procedures are developed to either teach the replacement behavior, improve the environment, or adjust the contingencies (or a combination of teach the behavior and improve the environment).

Antecedent-Reinforcement-Extinction (A-R-E) Components. ARE components support a systematic method for the construction of the intervention. Antecedent adjustments are made based on function and method to program (a) for new behaviors to be learned and aversive conditions to be avoided (Method 1); (b) conditions which set the occasion for the target behavior to be eliminated and new conditions to be established in which the replacement behavior is more likely to occur (Method 2); or (c) to make it more likely the replacement behavior will occur (Method 3). Reinforcement adjustments are made based on function and method to provide appropriate reinforcement for the replacement behavior (Hybrid of Methods 1 and 2), or to provide the consequence that previously reinforced the target behavior (but only for the replacement behavior). And finally, extinction procedures are made based on function and method to withhold the consequence that previously reinforced the target behavior (Methods 1, 2, and 3). ARE components are designed to either teach the replacement behavior, improve the environment, or adjust the contingencies (or a combination of teach the behavior and improve the environment).

Addressing Students' Challenging Behavior: Status of Functional Approaches in Schools

Anderson, Rodriquez, and Campbell (2015) synthesized the school-base literature to examine the status and trends of functional assessment literature in school settings. Their search identified 233 articles across 540 participants, of which the earliest study was published in 1981 (Weeks & Gaylord-Ross, 1981). After 1991, the publication of literature on functional assessment in school settings increased substantially. To date, most participants have been male (68.3%), in kindergarten through 8th grade (ages 4-14; 79.6%), and diagnosed with either intellectual disability (31.7%) or autism spectrum disorder (31.6%). Other diagnoses or classifications represented in the literature have included psychiatric diagnoses (8.0%), emotional or behavioral disorders (10.5%), learning disabilities (1.9%), or other health impairments (1.4%). 14.7% of participants had no educational psychiatric diagnosis or classification / label was not reported (0.3%). Anderson and colleagues (2015) identified differences in target behavior topographies displayed by either (a) students with autism or intellectual disabilities and (b) all other students. Behaviors most likely to be targeted for students with autism or intellectual disability included self-injury, elopement, stereotypy, physical aggression, tantrums, and inappropriate vocalizations. Among students without autism or intellectual disability, the most common behaviors included talking out of turn, defiance or verbal aggression, being off-task, being out of seat, and “problem behavior” (Anderson et al., 2015). These findings are consistent with school district and school-building efforts to implement IDEA (2004), as well as students without disabilities using three-tiered models of support (Common, Lane, Pustejovsky, Johnson, & Johl, 2017).

Evidence base of practice. Despite these variations, recent reviews have found interventions derived from functional assessment data to be effective in reducing problem behaviors (Common et al., 2017; Gage et al., 2012; Goh & Bambara, 2010; What Works Clearinghouse, 2016). Gage and colleagues (2012) examined the omnibus effect of FABIs across 69 functional assessment studies involving 146 subjects and 206 outcome graphs. It was found that these interventions reduced problem behaviors by an average of 70.5%, and the procedures implemented were effective regardless of student characteristics. Results were consistent with Goh and Bambara (2012) who found descriptive-based functional assessment-based interventions to be equally effective across diverse student populations and educational settings.

Most recently, Common and colleagues (2017) evaluated a systematic approach to functional assessment-based intervention following the Umbreit model. In their synthesis of functional assessment-based interventions for use in supporting school-age students with or at risk of high incidence disabilities, they quality-appraised individual studies and the overall body of work using Council for Exceptional Children’s (CEC) standards for evidence-based practices (2014), and then meta-analyzed within-case and between-case effect sizes. Results showed nine out of 18 studies to be methodologically sound, and demonstrated positive outcomes across 14 participants, but following CEC’s standards, FABIs utilizing the Umbreit model were classified under *insufficient evidence* to be deemed an evidence-based practice due to the small number of participants within, and across, studies despite a robust empirical literature bases. Within-case average effects were equivalent to increases of 118% across baseline and intervention phases. However, this analysis was underpowered due to the relatively small number of included studies (k = 18). Overall, these results were consistent with previous reviews explicitly establishing FABIs utilizing the Umbreit model to be a practice with a plethora of rigorous empirical support (Lane, Bruhn, Cronobori, & Sewell, 2009; Lane, Kalberg, & Shepcaro, 2009; Wood, Oakes, Fettig, & Lane, 2015).

Practitioner-led Functional Assessment-based Intervention

Despite these positive reviews demonstrating a strong methodological and efficacious evidence-base for functional assessment and interventions, few studies have guided practitioners through procedures such as selecting the type of functional assessment (e.g., descriptive or experimental) or the analysis of the data (Anderson et al., 2015). It is therefore not surprising studies have found some educators and other professionals to be inadequately prepared and often lacking necessary skills to coordinate functional approaches to assessment and intervention (Scott, Liaupsin, Nelson, & McIntyre, 2005; Van Acker, Boreson, Gable, & Potterton, 2005). Although it has been 35 years since the earliest functional assessment-based research in a classroom setting, and almost 20 years since IDEA called for functional assessment and BIP, many schools continue to struggle to identify the function of problem behavior (i.e., functional assessment) and to coordinate these results to guide their design and implementation of BIPs (Van Acker et al., 2005).

The process of coordinating procedures to design, implement, and evaluate functional assessments and interventions involves a large repertoire of component skills, like understanding principles of behavior; three-term contingencies; function; behavior dimensions; measurement systems; visual analysis; data-based decision making; and ethics (Behavior Analysis Certification Board; BACB, 2017). Although IDEA (1997) indicated training for school personnel involved in functional assessment was necessary, it did not specify the minimal skill set needed to implement function-based assessment and intervention procedures (Ervin, Ehrhardt, & Poling, 2001). Nor was there consensus regarding how FBA should be defined, or its specified procedures (Asmus, Vollmer, & Borrero, 2002; Ervin et al., 2001; Sterling-Turner, Robinson, & Wilczynski, 2001). While schools should be commended for their efforts in adopting theoretically-sound and empirically-validated functional approaches to promoting behavior change, some have argued IDEA put functional assessment methodologies into the hands of educators who lack the specific training, expertise, and resources need to implement them effectively (Kates-McElrath et al., 2007; Van Acker et al. 2005).

Professional Development in Functional Assessment-based Intervention: Practice-based learning

To empower educators to acquire, demonstrate, and gain fluency in functional assessment-based intervention, it is essential professional learning opportunities balance direct instruction andragogic techniques related to new content acquisition with the application of new skills. Unlike children, who learn through pedagogy (where the learner is dependent on the instructor for all learning), adults learn best through andragogy, which supports adult learners by emphasizing theory and practice, and facilitating self-directed learning (Smith, 2010). Practice-based learning integrates training (direct instruction in theory) and implementation (applied application and practice). It is grounded in an andragogic tradition of professional development. Practice-based learning is an instruction approach that encourages learners to apply their developing knowledge-base to applied, real-word problems (Levin, Hibbard, & Rock, 2002). Practice-based learning breaks down a task into sub-tasks which are targeted through direct instruction and practiced until a reasonable level of mastery is met within each sub-task (Ball, Sleep, Boerst, & Bass, 2009; Grossman et al., 2009).

Pre-service and in-service professional learning offerings should strive to empower educators with the requisite skills to understand, implement and coordinate functional approaches to behavior assessment and intervention - in both theory and practice. Training educators to *either* identify a function *or* develop an intervention is not enough for students who require the most intensive interventions, and further perpetuate gaps by failing to link the identified function to the subsequent supports. Further, many building and district administrators' processes may show an over-reliance on an expert model (e.g., behavior specialist or special educator) to carry out function assessment and function-based supports, while underestimating the professional capacity of other educators in the building to facilitate functional supports for their students (Loman & Horner, 2013).

Lane, Barton-Arwood, Spencer, and Kalberg (2007) examined how to support in-service educators to coordinate the functional assessment and BIP process by using the Umbreit model. Four elementary teams attended a university-led training series that included three 6-hr sessions (18 hrs total) and 1-hour on-site meetings twice per month (10-12 hrs total). Each school-site team identified one student to support and complete the functional assessment-based intervention Umbreit model with. During the training, teams analyzed data obtained from the functional assessment to develop a hypothesized function of the target behavior using the function matrix. Teams then designed interventions based on the function of the target behavior, with the goal of either reducing instances of the target behavior, or teaching a more appropriate replacement behavior. Teams received methodology training from the university's project staff throughout implementation. Two cases were offered as illustrations; both suggested a functional relation between the FABI and the desired changes in student's behavior.

More recently, Christensen and colleagues (Christensen, Renshaw, Caldarella, & Young, 2012; Renshaw, Christensen, Marchant, & Anderson, 2008) trained general education teachers to independently implement function-based supports as a pre-referral intervention. Across four 1-hr-long training sessions (4 hr) over a 10-week period, teachers were taught the rationale, principles, and procedures of the functional assessment-based intervention processes. Assigned independent readings consisted of 10 brief excerpts (1-5 pages) from Umbreit et al.'s (2007) text. Applied activities were embedded throughout the training to utilize an ongoing theory-to-practice process. Five applied activities related to completing the FBA process and five activities related to designing and implementing the behavior support plan. Cases were offered as illustrations which (a) demonstrate functional relation between the training and gains in teacher's function-based support knowledge and (b) illustrate desired changes in student's behavior.

Most recently, Lane and colleagues (Lane et al., 2015, Oakes et al., 2017) developed a practice-based professional learning series designed to teach school-based teams how to design, implement, and evaluate functional assessment-based intervention to support students exhibiting challenging behavior. Concepts and strategies taught and applied in this training were grounded in the FABI model developed by Umbreit and colleagues (2007) and in applied behavior analysis. Specifically, teams were taught a five-step process: *Step 1: Determining which students need a functional assessment-based intervention; Step 2: Conducting the functional assessment*; *Step 3: Collecting baseline data*; Step *4: Designing the intervention*; and *Step 5: Testing the intervention.* After each session, teams worked with coaches to complete each step of the functional assessment-based intervention process while supporting an actual student in the team member's classroom. Across studies, results suggest statistically significant improvements in participants' knowledge, confidence, and usefulness (KCU) of functional assessment-based intervention strategies taught.

Across literature examining the efficacy of the Umbreit model and related professional learning series, ample evidence suggests such practices are efficacious when implemented with minimal university support. In this dissertation, I examined how a practice-based professional learning series to support educators, with coaching, empowers educators by learning how to design, implement, and evaluate functional assessment-based intervention through team-based approaches in authentic educational settings.

Purpose of the Studies

To support school systems install, implement, and sustain functional assessment and function-based interventions in traditional school settings as part of team-based processes, educators need to be fully equipped with the skillset to design, implement, and evaluate functional assessment-based intervention. In this dissertation, I offer three chapters around the training educators in team-based approaches to designing, implementing, and evaluating functional assessment-based interventions.

Chapter 2. The purpose of this chapter was to examine the existing literature of how in-service educators have received professional learning to support their efforts in conducting functional approaches to assessment and/or intervention. Unlike some systematic reviews (e.g., meta-analyses and quality appraisal reviews), the goal of this paper was not to document the magnitude of effects or methodological quality of the overall literature base, but rather to establish a comprehensive survey of the literature to guide future researchers in professional learning around functional assessment and function-based interventions. The following questions were addressed:

1. What role did training participants (e.g., classroom teacher, administrator), trainers, consultants, and coaches (e.g., university researcher, technical assistance providers) perform in function-based assessment and intervention professional learning series?
2. How has function-based assessment and intervention professional learning series (as independent variable) been studied, including research design, treatment integrity, social validity, and trainee outcomes (as dependent variable)?
3. What was the nature of the professional learning series (e.g., training overview, method, strategies) and what skills were taught to educators?

Chapter 3. The purpose of this chapter was to examine participants' learning outcomes and progress over the course of a five-day practice-based professional learning series to teach and support educators learn a systematic approach to designing, implementing, and evaluating functional assessment-based interventions developed by Umbreit and colleagues (2007). Teams were randomly assigned to one of three training conditions, each of which involved instruction of this approach with either university trainer (Cohort A) or state trainers (Cohorts B and C). Previous research has demonstrated the success of the professional development series with university support (e.g., Lane et al., 2015; Oakes et al., 2015). This study examined the extent to which this professional training opportunity could be applied with minimal university support as part of a technical assistance offering. The following research objectives were addressed.

Research Objective 1: To explore procedural integrity of the professional learning series: (capturing what happened within and across each session) and describe stakeholders' experiences. This included questions related to trainers' procedural integrity with which trainers across the three cohorts conducted each of the five sessions, trainees' and coaches' participation and engagement within trainings, attendance of team members and district coaches, as well as coaching activities. Differences between cohorts were explored.

Research Objective 2: To explore FABI team progress and trainees' learning outcomes, including a description of the students with whom they supported. This included questions related to (a) trainees' learning within each session, (b) FABI teams' progression across the five steps, and (c) trainees' learning from start to finish. Differences between cohorts were also explored.

Research Objective 3: To explore student outcomes associated with FABI teams designing, implementing, and evaluating a FABI as part of applied learning activities associated with the professional learning series. This included a question related to the extent teams demonstrated a functional relation between the introduction of the independent variables and changes in student performance. Differences between cohorts were also explored.

Chapter 4. The purpose of this chapter was to offer a conceptual analysis of the development, installation, scaling up of functional assessment-based interventions for use in traditional school organizations. A well-articulated body of research exists for functional assessment-based interventions demonstrating both its efficacy and effectiveness across clinical and traditional school contexts. In recent decades, many areas in health, education, and human services have prioritized promoting and assuring the use of evidence-based practices. This chaptered explores the transportability of functional assessment-based interventions (a promising if not evidence-based practice to traditional school organizations; Wood et al., 2015). A transportability framework, derived from the implementation sciences, was used as a lens to articulate the trajectory of an evidence-based practice from knowledge development to utilization and application. Examples of how other fields as well as education have adopted applied behavior analytic practices are presented. Future recommendations for sustaining FABI in schools are also discussed.

Chapter 5. Finally, a general discussion is offered examining the educational implications of team-based functional assessment-based procedures in educational settings. Summary of findings across chapters are discussed as are generalizations and implications pertaining to future considerations for future research and practice.

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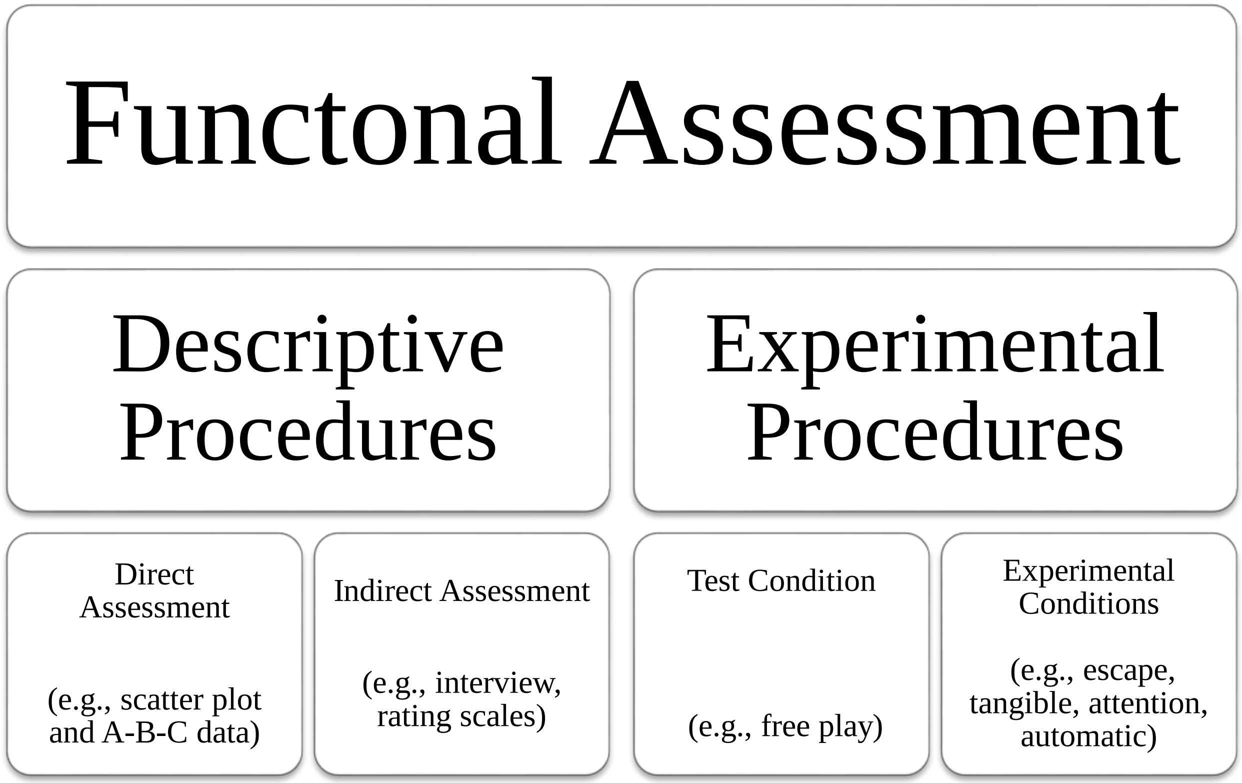

Figure 1. *Functional Assessment*

Chapter 2:

Literature Review

Functional Approaches to assessment and intervention: A systematic review of professional learning opportunities for Educators

Decades of research have shown how aside from reflexes, all behaviors are learned and maintained through the dynamic interactions of an organism with his or her physical and social environment (Cooper, Heron, & Heward, 2007). In brief, behaviors serve to either access (positive reinforcement) or avoid (negative reinforcement) attention, activities/tangibles, or sensory stimuli (Cooper et al., 2007; Umbreit, Ferro Liaupsin, & Lane, 2007). Functional assessment-based interventions (FABI) offer a systematic approach to support individuals who engage in challenging behavior with the goal of teaching functionally equivalent replacement behaviors. These procedures theoretically and empirically aligned with applied behavior analytic tenets (Baer, Wolf, & Risley, 1968; Cooper et al., 2007).

Functional approaches to assessment and intervention are teachable procedures which have aided educators, clinicians, and researchers supporting individuals who engage in challenging behavior across a range of clinical and natural settings, including schools. Today, there are many variations in how practitioners and researchers identify maintaining function(s) of behaviors. These approaches include descriptive and experimentally based procedures. Generally, descriptive methods involve indirect (e.g., records reviews, structured interviews, behavior rating scale) and direct (e.g., A-B-C and/or scatterplot data collection) procedures. Whereas experimental functional analysis (FA) involves testing one or more conditions–with at least one control condition–to directly observe and measure one or more target behavior(s) across conditions (Iwata & Dozier, 2008). However, there are many variations in conducting functional assessment, whether using descriptive (e.g., combinations of direct and indirect assessments), experimental (e.g., traditional versus trial-based functional analysis [TBFA]), or a combination of descriptive and experimental procedures.

Information garnered from functional assessments are then used to identify a functional relation between a behavior and its environment in order to design interventions directly linked back to the functional assessment's results. In most instances, the FABI or function-based behavior intervention plan (BIP) will use information gleaned from the functional assessment to design, implement and evaluate a BIP. Behavior intervention plans may include teaching the replacement behavior, improving the environment, and adjusting the contingencies (Umbreit et al., 2007).

Functional approaches to interventions initially developed under highly controlled settings, including clinical (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) and educational settings, such as self-contained classrooms (Weeks & Gaylord-Ross, 1981). During the last three decades, these approaches to assessment and intervention have moved beyond highly controlled settings and are now broadly used to support a diverse range of general and special education students across a variety of education settings (Anderson, Rodriguez, & Campbell, 2015). To date, highly trained experts who design, implement, and evaluate function-based interventions have been largely successful in identifying the reasons *why* challenging behaviors occur and writing successful BIP in educational settings (Common, Lane, Pustejovsky, Johnson, & Johl, 2017). However, supporting students with challenging behavior can be difficult even for the most equipped school-based professional. For instance, in one study, Ladner (2009) found only 30.6% of teachers reported being adequately prepared to manage challenging behaviors, and 46.8% reported having no training in FABIs. As such, many classroom teachers and related service providers have been challenged by the task of linking data collected and analyzed during the functional assessment process to the intervention (Van Acker, Boreson, Gable, & Potterton, 2005).

Functional Approaches to Assessment and Intervention in Schools

Concerns regarding the transportability of FABI from clinical to educational settings were exacerbated following the 1997 reauthorization of the Individuals with Disabilities Education Act. Some raised concerns regarding the evidence-base for its use across *all* educational contexts. Ervin, Ehrhardt, and Poling (2001) found out of 100 articles published between 1980 and 1999, few studies examined (a) low-rate problem behaviors or involved students without disabilities, (b) academic behaviors, (c) school personnel who implemented FABI without assistance, (c) social validity, or (d) the relative effectiveness of different variations of functional assessment. Others raised concerns regarding the lack of available research on how to train school personnel in the effective use of function-based procedures (Gresham, 2003; Quinn, Gable, Fox, Rutheford, Van Acker, & Conroy, 2001). Gresham (2003) examined school-based functional assessment procedures and found limited adequacy in terms of their reliability and validity, including (a) the stability and/or instability of behavior functions in authentic school settings, and (b) convergence between indirect and direct functional assessment procedures. Additionally, questions were raised about the evidence to suggest interventions matched with behavior function were more effective than behavior interventions not based on function.

Function-based procedures have been widely demonstrated to be successful by university (e.g., researchers) and clinical personnel (e.g., behavior analysts) over the past 35 years. However, the transportability of procedures proven efficacious under highly-controlled clinical conditions to an effective strategy for use in more applied settings, such as schools, has been a more recent shift, often under the support of university personnel (e.g., Lane et al., 2015). The logic of functional approaches to assessment and intervention are predicated on the principles and technologies of applied behavior analysis (Cooper et al., 2007). This includes: (a) behavior is purposeful, and serves a function for the individual; (b) behavior is situation specific, that is the individual is linked to his or her environment; and (c) information gleaned from the functional assessment is used to coordinate the design, implementation, and evaluation of an appropriate intervention. To maximally equip educators in function-based approaches to assessment and intervention, it is critical both procedural and theoretical foundations are targeted across professional development and applied learning opportunities.

Since the 1997 reauthorization of IDEA, research has shown that some educators and other educational staff (e.g., school psychologists) are inadequately prepared and often lack the skills (e.g., Behavior Analysis Certification Board [BACB], 2017) necessary to facilitate the systematic processes necessitated to coordinate the functional assessment and BIP process (Couvillon, Bullock, & Gable, 2009; Mortenson, Rush, Webster, & Beck, 2008; Pindiprolu, Peterson, & Bergloff, 2007; Van Acker et al., 2005). This is in part due to the extensive training and expertise required to conduct these procedures. The earliest recorded FABI supported students with developmental disabilities and self-injurious behavior, led by Weeks and Gaylord-Ross in 1981. It was not until 1991 literature regarding functional approaches to assessment and interventions began to increase and reflect its application across a wider range of students and settings (Anderson et al., 2015; Dunlap, Kern-Dunlap Clarke, & Robbins, 1991).

These findings are not surprising given legislation related to general and special education has remained ambiguous regarding (a) which *personnel* need to be familiar with functional approaches to assessment and intervention, (b) which *approaches* to functional assessment and intervention should be taught, and (c) which *instructional approaches* are most conducive in training school personnel (Collins & Zirkel, 2017). This has resulted in wide variation of roles, procedures, and content expertise related to designing, implementing, and evaluating function-based supports in school settings.

From clinic to classroom. Initially, interventions derived from functional assessments were performed in highly controlled clinical settings (Iwata et al., 1982/1994) and educational settings (Weeks & Gaylord-Ross, 1981) to support individuals with developmental disabilities from exhibiting self-injurious behavior. The 1997 and 2004 reauthorizations of the IDEA initiated changes in school personnel's use of disciplinary action towards students with disabilities to ensure free appropriate public education (FAPE) in the least restrictive environment (LRE; Turnbull, 2005). In response to schools' initiation of zero-tolerance policies in the 1990s, parents and schools called for adoption of more proactive and preventative responses to challenging behavior (O'Neill, Albin, Storey, Horner, & Sprague, 2015; Russo, Osborne, & Borreca, 2006). Although the increased attention on proactive and preventative efforts towards discipline such as FABI was generally positive, there were concerns regarding (a) the evidence-base supporting FABIs in school settings and (b) how best to train school personnel (Fox, Conroy, & Heckaman, 1998; Gresham, 2003; Quinn et al., 2001; Sasso, Conroy, Peck-Stichter, & Fox, 2001; Scott, Liaupsin, Nelson, & McIntyre, 2005).

Under the 2004 reauthorization of IDEA and federal regulations provided more guidance as to when to consider functional assessment (von Ravensberg & Blakely, 2014). As amended in 2004, functional assessments and BIPs are required following a disciplinary change in placement for a student receiving special education services when his or her behavior results in disciplinary action and the conduct in question is determined to be a manifestation of the student's disability (§ 1415[k][1][F][i]–[ii]). The 2004 amendments also offered new language for IEP teams to consider the use of positive behavioral interventions and supports strategies, and supports, and other strategies, in response to when the child's behavior impedes the child's learning or the learning of others (§1414[d][3][B][i]).

From special education to general education. During the last two decades, functional approaches to assessment and interventions have moved beyond IDEA's specifications in supporting students with disabilities and are now often available as a as a Tier 3 practice within three-tiered systems of support for students with intensive intervention needs, often detected using data from systematic screening tools (e.g., Student Risk Screening Scale, Drummond, 1994). Three-tiered systems of support have origins in public health and were transported to education to support all students' multiple needs. Positive behavior interventions and supports (PBIS; Horner & Sugai, 2015), a three-tiered model to support behavior, was first introduced in IDEA 1997. Later, response to intervention (RTI; Fuchs, Fuchs, & Compton, 2010), a three-tiered model to support academics, was introduced in the 2004 reauthorization of IDEA. Most recently, comprehensive, integrated, three-tiered (Ci3T) models of prevention (Lane, Oakes, & Menzies, 2014) have been introduced, blending academics, behavior, and supporting students' social-emotional development. Across these three-tiered frameworks, graduated systems and supports are put in place with increasing levels of intensity: primary prevention (Tier 1; for all), secondary prevention (Tier 2; for some), and tertiary prevention (Tier 3; for few; Lane, Oakes, Cantwell, & Royer, 2016).

Like FABIs, tiered systems are driven by comprehensive and systematic approaches to connect data collected as part of regular school practices (e.g., assessment data, screening data) with empirically-based interventions to maximally support students. Following three-tiered systems such as PBIS and Ci3T, FABI are considered a Tier 3 support available to all students who require this level of intensity, not just for students receiving special education following certain disciplinary decisions (Common et al., 2017). Under the most recent regulations regarding elementary and secondary education students, the Every Student Succeeds Act (ESSA, 2015; reauthorization of the Elementary and Secondary Education Act[ESEA]) included language to promote the use of three-tiered systems through teacher preparation, professional development, and in school districts' local uses of funds under Title II. As such, it is critical to empower school-based teams to the maximum extent possible with the necessary skillset to design, implement, and evaluate functional-based interventions (Scott et al., 2005).

From implementation to sustainability. To date, there remain many variations pertaining to FABIs. Despite these variations in procedures, FABIs are considered a promising practice with a considerable evidence-base. What Works Clearinghouse (WWC, 2016) found FABIs for students with or at-risk for EBD to have *potentially positive effects* on school engagement and problem behavior. Further, several reviews have evaluated the methodological quality and student outcomes associated with FABI and found strong empirical support (Common et al., 2017; Gage, Lewis, & Stichter, 2012). To promote the transportation of scientifically validated practices - like FABIs - into actual use by practitioners in the field, professionals have moved toward adopting implementation sciences models to support these efforts (Eccles & Mittman, 2006; Fixsen, Naoom, Blasé, Friedman, & Walace, 2005).

Fixsen, Blase, Duda, Naoom, and Van Dyke (2010) proposed implementation to occur in four stages: exploration, installation, initial implementation, and full implementation. With evidence to suggest two years of sustained fidelity to be a strong predictor of ongoing sustainability (Matthews, McIntosh, Frank & May, 2014; McIntosh, Mercer, Nese, Strickland-Cohen, & Hoselton, 2016). As such, to promote sustainable practices, it is critical educators be knowledgeable and confident in how to implement with fidelity. As such, the procedures, goals, and effects should socially significant, acceptable, and important (Common & Lane, 2017; Lane & Beebe-Frankenberger, 2004; Wolf, 1978). Indicators of social validity, such as the Primary Intervention Rating Scale (PIRS, Lane, Robertson, & Wehby, 2002), have been shown to predict treatment integrity of primary (Tier 1) prevention efforts and classroom management procedures (Lane, Kalberg, & Shepcaro, 2009; State, Harrison, Kern, & Lewis (2017). As such, it is critical educators be trained in functional approaches to assessment and intervention acceptable, usable within their school role and building context, and feasible to implement with a high degree of procedural integrity (McKenney, Waldron, & Conroy, 2013).

Professional Learning: Functional Approaches to Assessment and Intervention

Given, methodological quality and evidence base of FABI has been evaluated and identified as a promising practice leading to potentially positive student outcomes (Common et al., 2016; Gage et al., 2012; WWC, 2016), the next step in establishing the knowledge base for promotion of FABIs. This requires clearly identifying how educators and other professionals in the field have been trained to support the design, installation, and evaluation of FABI as a practice.

Initial adoption of FABIs in schools was in part supported through consultation models, which relied heavily on the expertise of one person inside or outside the building (Crone, Hawken, & Bergstrom, 2007). For example, Umbreit, Lane, and Dejud (2004) supported teaching staff in implementing FABI through classroom consultation. More recently, a growing body of professional development literature has focused on moving away from a consultation based (e.g., outside building experts) to collaborative model (e.g., with ongoing coaching and consultation to empower educators as within building experts). Other recent trends include practice-based learning, integrating theory and practice in structured and applied activities across professional learning opportunities (Lane et al., 2015).

Practice-based professional learning is well-aligned with how adults learn, by employing andragogical approaches to training in-service and pre-teachers (Ball & Cohen, 1999; Forzani, 2014). In such adult learning models, attendees or trainees receive direct instruction in theory with ample opportunities to practice a range of skills which supports integrating the newly acquired theory with the actual practice. FABI is well suited for practice-based learning, as it requires a balance of understanding the principles of behavior, basic knowledge in measurement and research, as well as the repertoire of behaviors necessary to design, implement and evaluation interventions (Lane et al., 2015).

Mapping the Literature

To date, there has been one systematic review of educational staff professional learnings related to functional approaches to assessment and intervention. McCahill, Healy, Lydon, and Ramey (2014) identified 25 studies with training and/or consultation models where trainees independently performed procedures related to functional assessment and/or intervention. In their review, they found professional development demonstrating desired outcomes of trainees trained using both descriptive and experimental approaches to functional assessment. The most common teaching strategies included video modeling, lectures, feedback, and written protocols. Twelve studies also presented results of FABIs implemented as part of the training process. Across these studies, treatment integrity was examined across 95.83% of studies by monitoring implementation related to the functional assessment and/or intervention process, and social validity was assessed across 66.67% of the studies evaluating student outcomes.

Purpose

The primary purpose of this systematic review was to provide a comprehensive map of literature related to professional learning opportunities for school personnel to be trained in functional approaches to assessment and intervention. We also extend the work of McCahill and colleagues (2014). First, this systematic review expanded the inclusion criteria and included all professional learning studies, including studies without independent performance in functional assessment or intervention procedures. Second, we limited our search to experimental design studies where the independent variable was the professional learning and training outcomes were the dependent variables. Specifically, our review focused on identifying (a) *which* educators and other school personnel were trained in functional approaches to either assessment and/or intervention, (b) *which* teaching practices were employed, and (c) *what* content was taught. We also attended to the persons involved in the training process including who was trained (trainees) and who led the professional development offerings (e.g., trainers, coaches, consultants), and how the professional learning process was evaluated. Research questions guiding our study included:

(1) What role did training participants (e.g., classroom teacher, administrator), trainers, consultants, and coaches (e.g., university researcher, technical assistance providers) perform in function-based assessment and intervention professional learning series?

(2) How has function-based assessment and intervention professional learning series (as independent variable) been studied, including research design, treatment integrity, social validity, and trainee outcomes (as dependent variable)?

(3) What was the nature of the professional learning series (e.g., training overview, method, strategies) and what skills were taught to educators?

Method

Article Selection Procedures

Procurement. Article procurement included independent electronic, ancestral, and hand searches of the literature by two doctoral candidates (hereby referred to as coders) in fall 2016 (see Figure 1). Coders used a consensus model when disagreements occurred. This included coders re-reviewing inclusion criteria and the full text of the article collaboratively until consensus was achieved.

Step 1: Electronic search. This process began with electronic searches, which included four databases using ProQuest (i.e., ERIC, PsycARTICLES, PsycINFO, Research Library) using the following search terms: (a) “CEU,” “coaching,” “Communities of practice,” “Continuing education,” “PD,” “performance support,” “PL,” “preservice ” “Professional development,” “Professional Learning,” “teaching,” “training,”; and (b) “ABC data,” “assessment based,” “behavior* assessment,” “behavior* intervention plan,” “FABI,” “FBA,” “function matrix,” “functional analysis,” “Functional assessment-based intervention,” “functional behavior assessment,” “function-based intervention decision model,” “function-based.” Search terms were sought anywhere except full text (e.g., title, abstract, keywords) and were limited to scholarly peer-reviewed journals and returned 345 unique records. Coders read titles and abstracts for possible inclusion (criteria described subsequently), with 29 articles retained. Coders read in full the 29 articles and found 14 met inclusion criteria. Interrater agreement (IRA) was calculated by dividing the number of agreements by sum of agreements and disagreements and multiplying by 100. For electronic searches, IRA was 95.07 and 100% for screening titles/abstracts and reading texts in full respectively (See Table 1).

Step 2: Ancestral search. Ancestral searches occurred (a) for included studies from the electronic search, (b) for articles included from the initial ancestral search, and (c) articles included from the hand search. This included reviewing (a) 477 citations and references from the initial ancestral search of articles included from the electronic search, (b) 277 citations and references from the 11 subsequent articles identified during the initial ancestral and hand search, and (c) 25 citations and references from a previous topically related review (McCahill et al., 2014) for a total of 779 references. Of the 779, 69 articles were downloaded and read in full for possible inclusion. From the ancestral search, nine articles were included in this review. IRA was 91.33 and 92.75% for screening in-text citations/references lists and reading texts in full respectively.

Step 3: Hand search. Finally, hand searches followed ancestral searches. Journals were selected for hand searching when they featured two or more identified articles, beginning in 2002 (year of earliest published included study) to 2016: *Education and Treatment of Children, Education and Training of Autism and Developmental Disabilities, Journal of Applied Behavior Analysis, Journal of Behavioral Education, Journal of Positive Behavior Interventions*, and *Teacher Education and Special Education*. From the hand search, 393 titles and abstracts were reviewed, with two articles read in full and included. IRA was 99.24 and 100% for screening in-titles/abstracts and reading texts in full respectively.

Inclusion criteria. Each article was read in its entirety and independently coded by the two coders to ascertain whether the article met the following inclusion criteria. First, the independent variable was a professional learning opportunity (i.e., individual or team-based) related to functional approaches to assessment or intervention (BIP). Examples included studies examining the efficacy and/or outcomes associated with a professional learning, coaching, or consultation model that included information from function assessment or the interventions derived from them. Non-examples included function-based assessment and interventions involving teacher training intervention that did not experimentally evaluate the training as an independent variable (e.g., Bessette & Wills, 2007). Second, the dependent variables targeted trainee (e.g., educator) outcomes, including knowledge, fluency (e.g., procedural fidelity, treatment integrity), or quality (e.g., quality appraisal of functional assessment or BIP). Non-examples included studies that only included student outcomes and treatment integrity measures to monitor the effects of a student-centered intervention (e.g., Lane, Barton-Arwood, Spencer, & Kalberg, 2007; Maag & Larson, 2004). Third, participants were in-service educators (e.g., general or special education teachers, counselors, school psychologists, district behavior specialists) from traditional educational settings. Non-examples included pre-service educators and other undergraduate and graduate students, third-party related service providers (e.g., outside behavior consultant, clinical psychologist), and university liaisons (e.g., Lane, Oakes & Cox, 2011). Fourth, studies followed an experimental design including single-case research design, quasi-experimental, experimental, and pre-post designs to discern causal (e.g., cause/effect or functional relationships between training and trainee outcomes (Horner et al., 2005; Gersten et al., 2005). Non-examples included case studies, correlational studies, and descriptive studies. Finally, articles had to be published in a peer-review journal in English; book chapters and dissertations were omitted as they may not have been evaluated using a peer review process. Ultimately, 25 studies were identified for inclusion.

Coding Procedures

Two doctoral candidates were trained to reliability at 85% or higher across three consecutive articles randomly selected from the 25 included studies for training purposes. IRA during reliability training for Coder A and Coder B averaged= 91.68% *(SD* = 3.29*;* Range*:* 88.46-95.03%). For reliability, the second coder coded 25% of all included studies (*n* = 7) in addition to the three coded during reliability training. Disagreements were resolved through a consensus process that included re-reviewing the coding protocol, coding sheet, and article collaboratively until consensus was reached. IRA averaged 89.63% *(SD* = 7.70; Range: 77.38-95.68%). To map the literature, provide a descriptive context of the included studies, and answer the three research questions, the following variables were coded and are described subsequently:

Roles of trainees, trainers, coaches, and consultants. To examine which practices related to functional approaches to assessment and interventions were taught to educators (trainees) across professional learning opportunities, the following categories were coded: training emphasis, trainee role and education background, trainer's role, coaches' role, and consultants' role, as applicable.

***Training emphasis*.** This category included whether the article included training in the following procedures: descriptive functional assessment, traditional FA, trial-based FA, and BIP. These variables were binary (present/not present) for reach training emphasis.

Trainee role. This category included identifying each article's trainee population and role in an educational setting. Educational trainee roles were dummy coded using a binary scale of (present/not present) for each role, comments were recorded for people with dual role (e.g., teacher/administrator). Coders also documented educational background, teaching experience, and experience in applied behavior analysis or functional approaches to assessment and intervention if reported.

Trainer, coach, and consultant role. This category included identifying each article's trainer, coach, and/or consultant's profession and role in the training series. Binary codes were used to identify if each trainer, coach, or consultant's primary role was with a university, state technical assistance provider, school district, school site, clinic, or other.

Empirical support: Professional learning in functional assessment and BIP. To document the empirical support for training educators in functional approaches to assessment and intervention, the following categories related to the training series were coded: training dosage, training location, training format, experimental design, independent variables, dependent variables, treatment integrity, and social validity.

Training dosage. This category included identifying the duration of each training series (e.g., five sessions over six months) and dosage/exposure to the independent variable associated with the duration (e.g., 7-hr sessions). Coders descriptively recorded what was reported across training elements or training packages.

Training location. This category included identifying each training series location for training related activity. Binary codes were used to identify if training occurred at-school, off-site, or remotely. Coders also reported descriptively what was described in the article.

Training format. This category included identifying each training series' format. Binary codes were used for whether training occurred in group (e.g., large group, small group) and/or 1:1 (e.g., 1:1 training, coaching, and consultation) format. Coders also descriptively reported what was described in the article.

Experimental design. This category included identifying the experimental design employed in the study to evaluate the effects of the training opportunity. Binary codes were used for quasi-experimental, experimental, pre/post, post only, and single-case research designs.

Independent variable: Professional learning. This category included identifying the independent variable (e.g., professional learning opportunity) and how it was operationalized.

This included all training, coaching, and consultation elements related to professional learning. Coders descriptively reported what was described in each article.

***Dependent variable: Professional learning*.** This category included identifying the dependent variables associated with monitoring the effects of the professional learning opportunity. Binary codes were used to identify dependent variables associated with (a) knowledge, confidence, and use, (b) fidelity and/or accuracy in implementation (i.e., either descriptive functional assessment, FA, or BIP procedures), and (c) other outcome elements. Coders descriptively reported what was described in each article.

***Treatment integrity: Professional learning*.** This category included identifying if any treatment or procedural integrity related to implementing professional learning was measured and assessed. Binary codes were used to identify dependent variables associated with (a) direct observation, (b) monitoring accuracy in implementing planned steps, (c) treatment integrity checklists, and (c) other measurement systems related to fidelity (e.g., coach's log). Coders also descriptively reported what was described in the article.

***Social validity*.** This category included identifying if any social validity constructs were measured. These constructs included (a) social significance of treatment or intervention goals, (b) social acceptability of treatment or intervention procedures, and (c) social importance of effects resulting from treatment or intervention (Kazdin, 1977; Wolf, 1978). Binary codes were used to identify whether studies discussed (a) constructs related to social validity (e.g., social importance of training educators; Council for Exceptional Children, 2014) and/or (b) formally measured social validity (e.g., objective and subjective measures; Common & Lane, 2017).

Teaching: Professional learning. To document which training practices were employed and what content was taught across professional learning opportunities, the following categories were coded: training techniques and training content.

***Training techniques*.** This category included identifying which training techniques were reported and emphasized in each study's professional learning procedures. Examples included direct instruction, providing written materials, using formative feedback, and error correction.

Binary codes were used to identify which training technique elements were present. Additionally, coders descriptively reported what was described in the article.

Training content. This category included identifying what content knowledge related to functional approaches to assessment or intervention was taught in the professional learning procedures as reported in the study. Examples included basic principles in applied behavior analysis (e.g., operant contingencies), teaching the concept of function, how to conduct functional assessment interviews, how to complete direct observation data collection, and interpreting graphs. Additionally, coders descriptively reported what was described in the article.

Results

Twenty-five studies met inclusion criteria, including a total of 525 participant trainees. Trainee category included administrators (e.g., principal, vice principal, special education district coordinator; *n* = 18), autism specialist (*n* = 1), behavior specialist (*n* =1), child developmental specialists (*n* = *2*), counselors (*n* = 13), education assistants (*n* = 11), general educators (*n* = 94), Head Start teachers (*n* = 3), Head Start teaching assistant (*n* = 1), learning specialists (*n* = 5), librarian (*n* = 1), school psychologists (*n* = *8*), special education teachers (*n* = 160), student management specialists (*n* = 3), student teacher (*n* =1), teaching assistant (*n* = 1), and additional roles not specified (*n* = 199). Nine studies included descriptive functional assessment training, eight studies included experimental FA training, five studies included TBFA training, and 14 studies included BIP training. Thirteen studies included training and/or consultation during the professional learning that included practice-based learning to coordinate the functional assessment and BIP process; of which, six studies reported including the classroom teacher of the student receiving the support (Bethune & Wood, 2013; Christensen et al., 2012; Flynn & Lo, 2016; Lane et al., 2015; Noell et al., 2005; Renshaw, Christensen, Marchant, & Anderson, 2008).

Roles of Trainees, Trainers, Coaches, and Consultants Across

To answer the first research question regarding the role training participants, trainers, consults, and coaches performed in function-based assessment and intervention across the learning series, information is summarized subsequently and organized across studies that emphasized descriptive functional assessment procedures, experimental functional assessment procedures, or BIP. For information on training dosage, location, and format, see Table 3.

Across the 25 included studies, 17 articles reported information on trainees' educational background. Trainees were representative of educators with a range of educational backgrounds from high school diploma to doctoral degree. Across all studies, 13 studies reported trainees' experience in applied behavior analysis and/or functional approaches to assessment and intervention. Two studies reported participants who were certified with BACB (Chok et al., 2012; Kunnavatana, Bloom, Samaha, & Dayton, 2013a). Seven studies reported participants who had training in applied behavior analysis, functional approaches to assessment or intervention, and/or classroom management (Browning-Wright et al., 2007; Flynn & Lo, 2016; Kraemer, Cook, Browning-Wright, Mayer, & Wallace, 2008; Loman & Horner, 2014; Pence, Peter, & Giles, 2014; Rispoli et al., 2016; Strickland-Cohen & Horner, 2015). Finally, 11 studies reported teaching experience, which ranged from 1-27 years.

Most trainers and coaches were researchers from university settings. Twenty studies reported trainer role. Across included studies (*n* = 25), 15 studies (see Table 3; 60%) included trainers who were university/researcher personnel (e.g., first author; Lane et al., 205). Two studies were conducted in partnership with district personnel who either led training (Dukes, Rosenberg, & Brady, 2008) or supported the training with coaching (Lane et al., 2015). Other specified trainers included state trainers (Browning-Wright et al., 2007; Kramer et al., 2008; 8%), school staff (Chok et al., 2012; 4%), and behavior analysts (Pence et al., 2014; 4%). Nine studies included coaching or consultation, of which seven studies included coaches/consultation from university personnel (e.g., researcher, professor, graduate student; See Table 3), one study included district-level coaches (Lane et al., 2015) and one study was non-specified (Codding et al., 2005).

Descriptive and Experimental Approaches to Functional Assessment, and BIP Training

Descriptive Approaches. Nine studies provided training around descriptive functional assessment procedures, of which eight studies also included training in BIP (Bethune & Wood, 2013; Christtensen et al., 2012; Crone, Hawken, Bergstrom, 2007; Dukes et al., 2008; Lane et al., 2015; Loman & Horner, 2014; Noell et al., 2005; Renshaw et al., 2008), and one study also included training in FA (Erbas, Tekin-Iftar, & Yucesoy, 2004).

Across these studies, eight included applied learning opportunities in the natural environment (e.g., working in a school setting) where trainees worked with an actual student in the design, implementation, or evaluation of the functional assessment or BIP process. First, Noell and colleagues (2005) provided general education teachers consultation support in implementation of function-based treatment plans. General educators participated in the functional assessment process, which was led by doctoral students in school psychology. Erbas, Tekin-Iftar, and Yucesoy (2006), trained five special educators and one student teacher how to conduct functional analysis employing descriptive functional assessment techniques (e.g., interviews, direct observation) in addition to experimental functional analysis. Trainees did not receive training in BIP. Crone, Hawken, and Bergstrom (2007) trained 68 educators (see Table 2) to conduct descriptive functional assessment and how to design, implement, and evaluate BIPs. In between trainings, trainees practiced the skills in their building. Across this project, 66 students received function-based support and 11 students received individualized targeted interventions. Christensen and colleagues (Christensen et al., 2012; Renshaw et al., 2008) trained four general educators to coordinate the functional assessment and BIP across a series of studies. Across studies, participating teachers worked with a student in applied activities to support the coordinated process of conducing the functional assessment and designing, implementing, and evaluating the BIP. Bethune and Wood (2013) trained special education teachers in functional assessment and provided workshop time to help teachers leave the training with developed BIPs for their targeted student. Ongoing coaching was provided to support implementation. Lowman and Horner (2014) trained 12 school professionals with flexible roles (see Table 2) in functional assessment and BIP processes. Ten of the 12 professionals individually completed a functional assessment with an actual student, with the functional assessment results being confirmed by university personnel (i.e., graduate students). Lane and colleagues (2014) trained 48 educators, across 19 school-based teams, in functional assessment and BIP processes. Each team supported one student and completed applied activities between sessions which were related to designing, implementing, and evaluating a FABI.

Conversely, Dukes, Rosenberg, and Brady (2008) evaluated the effectiveness of training special education teachers in functional assessment and BIP without an applied component. This training included case studies and role-play activities. Homework assignments were also assigned between the second and third day of training, consisting of short-answer questions.

Across the nine studies including functional assessment training, all but two were led by university personnel (e.g., researcher, doctoral student; for more information see Table 2). Two studies worked in collaboration with district personnel. Dukes et al. (2008) was led by district trainers in collaboration with the university. And finally, Lane et al. (2015) was led by university trainers and included district-level coaches to support problem-based learning activities.

Experimental Approaches. Thirteen studies provided training around experimental functional analysis procedures (e.g., traditional or trial-based FA). Eight studies included traditional FA procedures (Chok, Shlesinger, Studer, & Bird 2012; Erbas et al., 2006; Machalicek et al., 2010; Mckeney, Waldron, & Conroy, 2013; Moore et al., 2002; Rispoli, Neely, Healy, & Gregori, 2016; Wallace, Doney, Mintz-Resudek, & Tarbox, 2004; Ward-Horner & Sturmey 2012) and six studies focused on trial-based FA procedures (Flynn & Lo, 2016; Kunnavatana et al., 2013a; Kunnavatana, et al., 2013b; Pence et al., 2014; Rispoli et al., 2015; Rispoli et al., 2016). Rispoli and colleagues (2016) included both procedures in their training series. Across these 13 studies, two studies also included training in BIP (Chok et al., 2012; Flynn & Lo, 2016).

Six studies trained educators (see Table 2 for details) to conduct traditional FA procedures, which included *in vitro* (e.g., conducted in training environment with trainer or graduate student) or *in vivo* (e.g., conducted in natural setting with actual student in classroom) demonstrations. Educators included general and special education teachers, school psychologists, school staff, and certified teacher assistants (see Table 2 for details). Four studies included in-vitro and in-vivo training (McKenney et al., 2013; Moore et al., 2003; Wallace et al., 2004; Ward-Horner et al., 2012); one study included in-vitro training only (Chok et al., 2012); and two studies included in-vivo training only (Erbas et al., 2006; Machalicek et al., 2010). Similarly, five studies trained special education and Head Start teachers in TBFA procedures (see table 2 for details). Across these studies, all studies employed in-vitro and in-vivo training (Kunnavatana et al., 2013a; Kunnavatana et al., 2013b; Pence et al., 2014; Rispoli et al., 2015). One study taught special educators and one special education district coordinator both FA and TBFA employing in-vitro and in-vivo training. Across studies, trainers, coaches, and consultants included university personnel and school staff, and the majority were provided with university support (see Table 2 for more information).

Of the thirteen studies that provided training in traditional or trial-based FA procedures, two studies included training educators in BIP. In addition to FA training, the training program used in Chok, Shlesinger, Studer, and Bird (2012) also included training in interpreting multi-element functional analysis graphs, determining next steps when functional analysis data were undifferentiated, and selecting function-based interventions linked to FA data. Finally, Flynn and Lo (2016) trained special educators to connect information garnered from the TBFA to design and implement BIPs employing differential reinforcement procedures for alternative (DRA) behaviors.

Behavior intervention plan. Four studies provided only training in BIP and provided no training in functional assessment (Codding et al., 2005, Browning-Wright et al., 2007, Kraemer et al., 2008, Strickland-Cohen & Horner, 2015). Of these four studies, state trainers led two trainings (Browning-Wright et al., 2007; Kramer et al., 2008) and university personnel led two trainings (Codding et al., Strickland-Cohen & Horner, 2015).

Two studies focused on BIP development and/or implementation. Codding, Feinberg, Dunn and Pace (2005) evaluated the effects of performance feedback on the percentage of special education teacher's implementation of BIP antecedent and consequence procedures using a consultation model. Behavior intervention plans had been previously created and had been in place for an average of four months prior to the time of the study. Strickland-Cohen and Horner (2015) trained 13 school professionals in core features related to descriptive functional assessment and BIP and to lead teams in developing BIPs related to functional assessment data collected by researchers.

Conversely, two studies provided training to educators to evaluate the quality of BIP using the Behavior Support Plan-Quality Evaluation Guide (BSP-QE; Browning-Wright, Saren, & Mayer, 2003). First, Browning-Wright et al., (2007) trained school psychologists, resource specialists, and behavior specialists, followed by Kramer et al. (2008) who trained graduate students who also worked in schools (e.g., special education teachers, administrative support positions, school psychologists in training). Across studies, trainees completed a behavior support plan prior to and following training, which was then scored using the BSP-QE by university personnel (e.g., graduate students).

Empirical support: Professional Learning in Functional Assessment and BIP Training Series

To answer the second research question regarding the experimental support for professional learnings to train educators in function-based assessment and intervention, the following variables were coded and are described subsequently: experimental design, trainee outcomes (dependent variable), treatment integrity, and social validity.

Experimental design and independent variable. Across the 25 included studies evaluating the effects of training series, most studies employed a single-case research design (*n* = 17; e.g., Moore et al., 2002; Renshaw et al., 2008), followed by pre- and post-test designs (*n* = 6; e.g., Crone et al., 2007; Lane et al., 2007), post-test only design (*n* = 1; Dukes et al., 2008), and 3-by-3 split-plot analysis with factors for time (*n* = 1; Noell et al., 2005). Studies employing single-case research designs employed a range of designs appropriate for evaluating the effects of learning, including multiple baseline design across subjects, multiple probe designs, alternating treatment, and multiple element designs. Additional single case designs were used to evaluate distal measures of training – primarily student outcome data – by employing A-B and

A-B-A-B withdrawal designs. For more information on experimental design and independent variables associated with professional learning see Table 4.

Dependent variable. Dependent variables across the 25 studies are summarized in Table 4. The primary dependent variables to monitor the effects of the training series revolved around procedural fidelity, treatment integrity or accuracy in conducting the functional assessment or implementing the BIP (e.g., Codding et al., 2005; Erbas et al., 2006; Machalicek et al., 2010; Wallace et al., 2004). This was followed by perceived- and actual-knowledge assessments and surveys of intervention practices (e.g., Crone et al., 2007; Lane et al, 2015; Renshaw et al., 2007); accuracy interpreting and analyzing graphs (e.g., Chok et al., 2012); number of sessions required to reach training criterion (e.g., Rispoli et al., 2016); social validity (E.g., Crone et al, 2007), contextual fit rating scales (e.g., Strickland-Cohen et al., 2105), and perceived usefulness (Lane et al., 2015); and BSP-QE (e.g., Browning-Wright et al., 2007). The least common dependent variables included accuracy responding to undifferentiated FA data (Chok et al., 2012) and selecting interventions (e.g., Chok et al., 2012).

Treatment integrity. Treatment integrity was used to monitor the fidelity of the professional learning opportunities in 10 out of 25 included studies. Four studies employed treatment integrity checklists (Bethune & Wood, 2013; Flynn & Lo, 2016; Loman & Horner, 2014; Machalicek et al., 2010) and four studies employed planned steps to monitor fidelity (Chok et al., 2012; Erbas et al., 2006; Rispoli et al., 2015; Rispoli et al., 2016). Ward-Horner and Sturmey (2012) monitored correct implementation of modeling, rehearsal, and feedback training to monitor fidelity. Finally, Noell et al. (2005) employed procedural guides and checklists, interview forms and checklists for meetings, and activity date logs, which were monitored by lead authors through the course of the study.

Social validity. In all articles, discussion included the social significance of professional learning goals, social acceptability of professional learning procedures, and/or social importance of effects resulting from the professional learning. Additionally, 16 studies quantifiably measured social validity, of which 15 studies measured social validity using a questionnaire, survey, or related instrument (e.g., Codding et al., 2005; Christenson et al., 2012; Mckeney et al., 2013); and one study kept a time log, a measure related to treatment acceptability (Lowman & Horner, 2014). See Table 4 for more information.

Teaching: Professional Learning

To answer the third research question and map the nature of professional learning series related to functional approaches to assessment and intervention, information related to training techniques and content skills were synthesized. See Tables 5 (training techniques) and 6 (content skills) for a summary of this information.

Training techniques. Across training series, 20 unique instructional design or learning techniques were highlighted in training series procedures. The most frequent training technique was to provide written materials (e.g., Christensen et al., 2012; Kunnavatana et al., 2013; Moore et al., 2002), followed by direct (didactic) instruction (e.g., Bethune et al., 2013; Wallace et al., 2004), feedback (e.g., Lane et al., 2015), and practice (e.g., Ward-Horner et al., 2012). The least frequent techniques included summative assessment (e.g., Erbas et al, 2006), coaching (e.g., Bethune et al., 2013), pyramid training (e.g., Pence et al., 2014), error correction (e.g., Machalicek et al., 2010), and prompting. (e.g., Rispoli et al., 2015).

Training content. Across training series, 21 content-related skills were highlighted in the description of the training curricular content. The most frequent content areas covered included function (e.g., Kraemer et al., 2008; Lane et al., 2015), experimental functional analysis (e.g. Moore et al., 2002; Ward-Horner et al, 2012), BIP/behavior change tactics (e.g., Bethune et al., 2013; Loman et al. 2014), replacement behavior (e.g., Flynn et al, 2016; Mckeney et al, 2013, descriptive functional assessment procedures (e.g., Lane et al., 2015; Lowman & Horner, 2014), ABA (e.g., Browning-Wright et al., 2007), evaluating/monitoring effects (Crone et al., 2007), interviews (e.g., Lane et al., 2015), visual analysis (e.g., Renshaw et al., 2008), and operationally defining behavior (e.g., Flynn et al., 2016). The least frequently covered content areas included single-case research design (e.g., Lane et al., 2015), record reviews (e.g., Lane et al., 2015), problem solving (e.g., Chok et al., 2012; Crone et al., 2007), behavior dimensions (e.g., Lane et al, 2015), rating scales, (e.g., Lane et al., 2015) treatment integrity (e.g., Lane et al., 2015), social validity (e.g., Lane et al., 2015), and ethics (e.g., Lane et al., 2015).

Discussion

This review offers comprehensive map of empirically-supported professional learning opportunities with in-service educators to promote functional approaches to assessment and intervention. Findings from this review highlight some of the considerations, complexities, and challenges associated with functional assessment-based interventions designed, implemented, and/or evaluated by school personnel.

Results from this synthesis found a wide range of functional approaches to assessment and intervention, as well as specific content areas, which have been taught to teachers and other school personnel. Most trainees served as general and special educators within their school building and many were the classroom teacher of the student receiving FABIs (e.g., Christensen et al., 2012; Lane et al., 2015; Renshaw et al., 2008). Additionally, trainees served the roles of related service providers, administrators, and other staff were also represented across included studies. This broad sample of educators shows the growing commitment in the research and school community to empowering all educators in the principles of applied behavior analysis and functional approaches to assessment and intervention (Crone et al., 2007; Scott et al., 2005). The assortment of school personnel demonstrates the commitment of schools to move toward team-based collaborative models that build on the strengths of educators in the building rather than a single individual. Findings suggested such skills can be effectively taught to a variety of educators regardless of role, education level, or prior experience in applied behavior analysis. These results are consistent with previous reviews (McCahil et al., 2014).

A wide variety of training techniques were reported across the included studies. These findings are consistent with previous reviews noting the variation in (a) what procedures and data are collected during the functional assessment process and (b) how interventions are designed based on results of the functional assessment (Gage et al., 2012; Lane, Bruhn, et al., 2009). Most training techniques identified in this review were consistent with professional development models that emphasize direct instruction, practice-based learning, and opportunities for feedback. Most studies included in this review (n = 13; 52%) trained educators in experimental approaches to functional assessment (i.e., FA). Only nine studies (36%) targeted descriptive approaches to functional assessment. These findings offer a counter-narrative to myths positing experimental functional assessment procedures, such as traditional or trial-based FA, as being too resource-intensive for use in school settings (e.g., time, financial resources, expertise; Hanley, 2012).

These results are surprising considering the content skills required in experimental approaches to functional assessment, which include: (a) symmetrically controlling and changing environmental contexts by condition or phase; (b) understanding the principles of applied behavior analysis broadly, and more specifically operant contingencies, function, reinforcement, and extinction; (c) measurement systems, data collection; and (d) graphing and visual analysis. These are all skills that are essential in designing, implementing, and evaluating interventions. However, an educator conducting FABI using only descriptive procedures could be successful with a basic understanding in only: (a) the principles of applied behavior analysis (and more specifically, operant contingencies, function, reinforcement, and extinction), (b) behavior in relation to topographical and functional class; and (c) skills in direct observation, interviewing, record review, and completing rating scales. Professional learning offerings may be wise to emphasize the coordinated process by teaching functional approaches to both assessment and intervention. To promote meaningful improvement in educators' knowledge, confidence, and use in designing, implementing, and evaluating functional assessment-based interventions, increased emphasis must be placed on the entire process, including theoretical and procedural aspects of FABI (Ball & Cohen, 1999; Forzani, 2014).

One challenge with synthesizing this literature review was the variability in packaging training-level and student-outcome level procedures and research elements (e.g., independent variable, dependent variable, treatment integrity). In monitoring the effects of an intervention, it is critical that researchers can answer questions around treatment integrity, social validity, and participant outcomes related to the independent variable of interest. One complexity identified in this review was the variation and extent to which the professional learning (trainee-level) or applied learning (student-level) applications were emphasized and reported in the experimental design, data, or visual analysis plans. As funding agencies continue to prioritize student outcomes in professional learning (U.S. Department of Education, Institute of Education Science, 2014) it is critical quality indicators (e.g., Council for Exceptional Children, 2014) are integrated at every level in designing, implementing and evaluating studies examining professional development as an independent variable, as well as the student-centered interventions that follow. Monitoring treatment integrity, social validity, and trainee or student outcome data are important considerations for ongoing research.

Implications for Researchers

These findings are important, considering previous literature demonstrated many challenges some educators face in coordinating the functional assessment with the intervention plan (Van Acker et al., 2005). To maximally equip educators, professional learning must target and emphasize the coordinated process that links functional assessment to functional intervention, such as through practice-based learnings that target each step of the process. To build and sustain professional learning series to support these efforts, it is critical training series be evaluated following current methodological standards. Research in implementation science has found procedural integrity is critical toward sustaining practices (Matthews et al., 2014; McIntosh et al., 2016). Methodological quality-appraisal tools have also emphasized the importance of regularly assessing and reporting implementation fidelity related to adherence and dosage throughout implementation and across interventions (Council for Exceptional Children, 2014). As current trends in educational funding continue to emphasize student outcomes, it is critical that professional development and learning studies monitor and assess (a) procedural integrity across training procedures (e.g., trainer level) and intervention procedures (e.g., trainee-level as part of practice-based learning), and (b) trainee outcomes (e.g., knowledge gains) and student outcomes (e.g., changes in student's target or replacement behavior).

Implications for Practitioners

To guide practitioners in selecting the most appropriate practices, future researchers should provide a strong theoretical and empirical support not only in the evaluation and evidence base of the practices (e.g., FABI; Common et al., 2016) but also in the acceptability of training, implementation, and sustaining such practices as part of regular school practices in regular school contexts. Collectively, this literature should strive toward sustaining these implementation practices and bringing to scale functional approaches to assessment and intervention as outlined in IDEA and ESEA.

While there remains wide debate over the merits of descriptive versus experimental functional assessment (e.g., traditional or TBFA) procedures, the field generally agrees both experimental (Mueller, Nkosi, & Hine, 2011) and descriptive (Common et al., 2017) are possible and can be practically implemented. Further interventions (e.g., BIP, FABI) derived from both experimental and descriptive assessment procedures have led to significant improvements in student outcomes (Gage et al., 2012; Goh & Bambara, 2012).

Limitations and Future Directions

Interpretation of the findings reported in this review should be taken into consideration with the following limitations. First, although a replicable systematic review process was used to identify eligible material across multiple electronic databases in conjunction with ancestral and hand searches it is possible relevant studies were not reviewed for possible inclusion. Although the electronic search identified 48% of the included studies, 36% and 8% of the included studies were identified through ancestral and hand searches respectively; these patterns may indicate literature related to professional learning in functional approaches to assessment and intervention as opposed to student-centered intervention research may be cofounded. These findings are consistent with trends in U.S. Department of Education’s (2014) calls for professional development for educators to emphasize training outcomes related to student outcomes. As funding agencies continue to prioritize student outcomes in professional learning, it is critical multi-level interventions target every level (e.g., teacher level: training and training outcomes;

student-level: teacher implementation and student outcomes) associated with the research questions and that the theory of change is clearly articulated (U.S. Department of Education, Institute of Education Science, 2014). Future professional development research should clearly operationalize and define their theory of change across trainee- and student-level's and as relevant clearly describe and define at every level: (a) participants and intervention agents, (b) description of practice, (c) implementation fidelity, (d) outcome measures/dependent variables, and (e) data analysis.

Second, only articles in peer-reviewed journals were included; dissertation, theses, and chapters were excluded. Dissertations and chapters were omitted as the peer-review process is an important component related to scientific inquiry, and these types of manuscripts have not been evaluated using the peer review process beyond the university setting. It is possible this restriction of including only peer-reviewed, published manuscripts may have introduced systematic bias in what was included based on differences in outcome reporting identified between published and unpublished research (Pigott, Valentine, Polanin, Williams, & Canada, 2013). However, the goal of this review was to yield descriptive information and map the current literature base, not evaluate the quality or magnitude effect of the empirical evidence. As the research base in supporting educators to learn to design, implement, and evaluate functional assessment-based interventions grows, future reviews should employ quality appraisal tools and meta-analysis techniques. Future meta-syntheses procedures associated with either (a) evaluating key study components (e.g., quality indicators; Council for Exceptional Children, 2014) or (b) meta-analyzing treatment effects (e.g., effect sizes) should consider including published and non-published (e.g., theses, dissertations) into search parameters.

Third, articles were coded based on the information garnered from each manuscript, with a priority placed on information reported in the method section and more specifically procedures. All articles were read in full, and when warranted procedural aspects reported in the introduction or discussion were also included. Corresponding authors were not contacted on what, if any, additional training techniques or content skills were included in training if not emphasized in the study. For example, it is possible and likely many professional learning opportunities included in this review included training specific to applied behavior analysis and more specifically function, but if not explicitly reported, were not included in this review. Therefore, findings may be incomplete, given the purpose of many articles was not to describe in detail every training technique and content skill taught. Future research in professional learning should consider and include supplemental appendices and online resources related to training procedures.

Summary

The studies reported in this review found a wide range of educators trained in functional approaches to assessment and intervention. While most studies in this review focused on experimental functional assessment procedures–such as FA–few of these studies simultaneously taught educators to use the identified function to inform and guide intervention development. Whereas, most educators who learned to design, implement, and evaluate FABI, were taught in tandem to conduct descriptive functional assessment procedures. These findings are consistent with previous literature examining the feasibility and efficacy of functional approaches to assessment and intervention including descriptive and experimental assessment procedures. These findings suggest a high degree of utility within the context of traditional school settings by empowering a broad range of experts in applied behavior analytic technologies. This review found more research is needed to support the coordinated process linking functional assessment to intervention, particularly for experimental functional assessment procedures (e.g., FA). The current empirical support is positive, with 25 studies to date training in-service educators to engage meaningfully in learning and/or engaging in functional approaches to assessment and intervention – including implementing FABI in their classrooms with minimal university support. However, although positive outcomes were associated with professional learning opportunities, there remain some limitations in the current body of literature. Future research should focus on coordinated trainings in functional approaches to assessment and intervention, and incorporating core components associated with high quality research at every level.

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Note. References with an asterisk indicate studies included in the systematic review.

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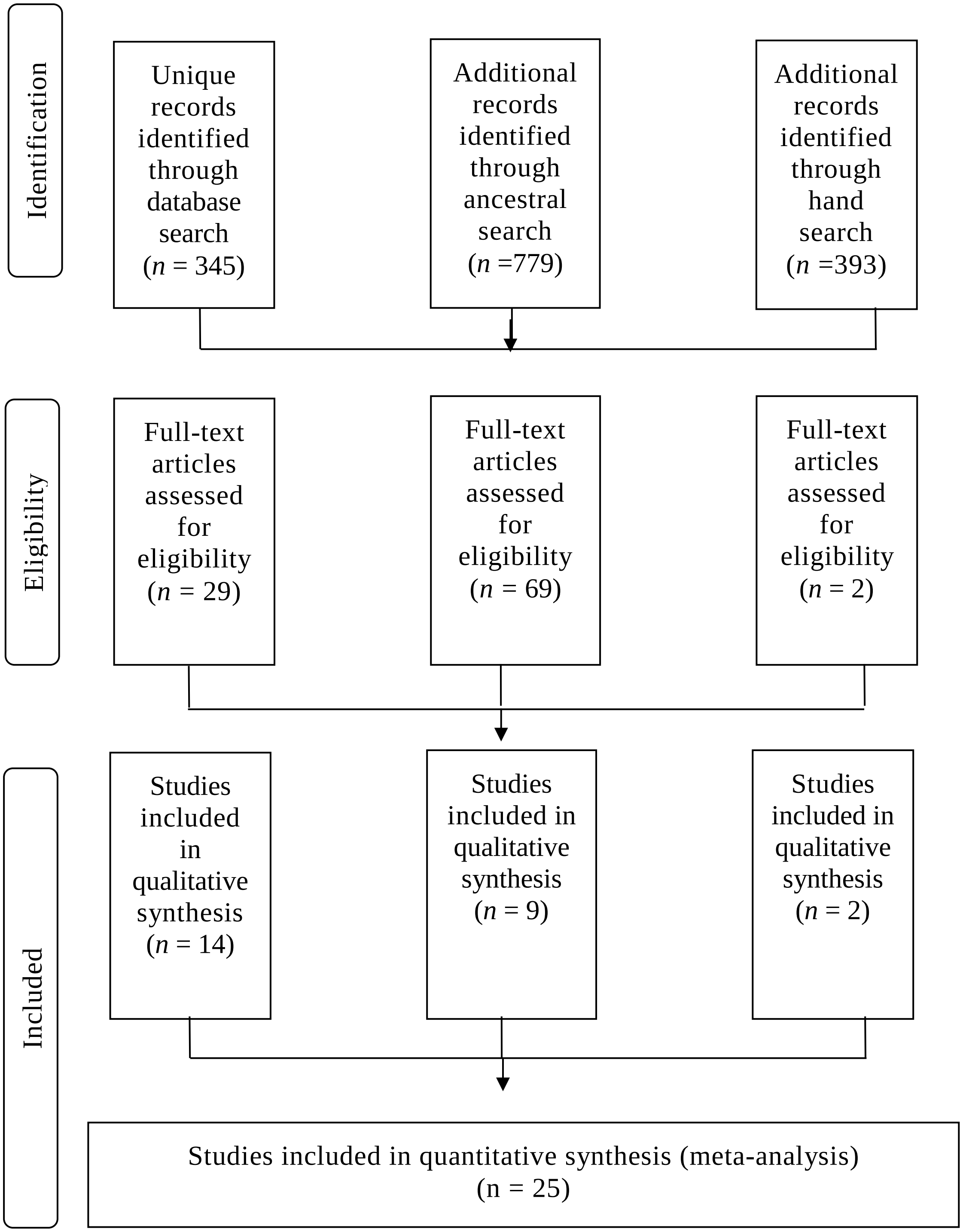

Figure 1.
PRISMA Flow Chart
Note: Adapted from: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. *PLoS Med 6*(7): e1000097. doi:10.1371/journal.pmed1000097

Table 1.
Article Selection Process

Article Selection Process	Screened		Included	Reliability
	Possible	Retained		IRA (%)
Electronic				
Screened: Titles/Abstract	345	*29*		95.07
Screened: Full text	29		14	100
Ancestral				
Screened: In-text citations, reference list of included studies/reviews	779	69		91.33
Screened: Full text	69		9	92.75
Hand Search				
Screened: Titles/Abstract	393	2		99.24
Screened: Full text	2		2	100
Included Articles			25	

Note. First pass refers to reading titles & abstracts. Second pass refers to reading full article. IRA = interrater agreement.

Table 2.
Roles of Trainees, Trainers, and Coaches/Consultants

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Trainees	Trainers	Coaches/ Consultants
Moore et al. (2002)	-	FA	-	3 GE teachers	Researcher (University setting)	NA
Wallace et al. (2004)	-	FA	-	3 (1 GE, 1 SPED, 1 SP; 35 attended training not part of study)	Not specified	NA
Codding et al. (2005)	-	-	BIP	5 SPED teachers	Researcher (Not specified)	Consultants (not specified)
Noell et al. (2005)	Desc. FBA	-	BIP	48 GE teachers (45 after attrition)	NA	Consultants (doctoral students; school psychology)
Erbas et al. (2006)	Desc. FBA	FA	-	5 SPED teachers & 1 student teacher	Researcher (University setting)	Consultants (university)
Crone et al. (2007)	Desc. FBA	-	BIP	68 (24 GE and 7 SPED teachers, 12 administrators 3 counselors, 4 school psychologist, 1 learning specialist, 1 librarian, 2 child development specialist, 3 student management specialist, 11 education assistant)	Researcher (University setting)	NA
Browning-Wright et al. (2007)	-	-	BIP	169 attended training and completed pre/post (mostly school psychologist, resource specialists, and behavior specialists; 200 attended first training)	State Trainer	NA
Dukes et al. (2008)	Desc. FBA	-	BIP	73 SPED teachers completed district training and post-survey (an additional completed 52 completed survey but not training and 150 teachers did not return survey)	District Trainers (in collaboration with university)	NA

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Trainees	Trainers	Coaches/ Consultants
Kraemer et al. (2008)	-	-	BIP	22 (graduate students; 18 current SPED teachers, 4 held other positions)	State Trainer	NA
Renshaw et al. (2008)	Desc. FBA	-	BIP	4 GE teachers	Researcher (University setting)	Consultants (University researchers)
Machalicek et al. (2010)	-	FA	-	6 teachers (private school for students with developmental disabilities and ASD)	NA	University Supervisor
Chok et al. (2012)	-	FA	BIP	3 staff (private day and residential school for students with ASD and other developmental disabilities)	School Staff Trainer	NA
Christensen et al. (2012)	Desc. FBA	-	BIP	1 GE teacher (4 additional participants received training but did not participate in research)	Researcher (University setting)	Consultants (University researchers)
Ward-Horner et al. (2012)	-	FA	-	3 certified teacher assistants	Researcher (University setting)	NA
Bethune et al. (2013)	Desc. FBA		BIP	4 SPED teachers	Researcher (University setting)	Researcher (University setting)
Kunnavatana et al. (2013b)	-	TBFA	-	5 SPED teachers (additional 23 teachers received in-service but did not participate in study)	Researcher (University setting; trained program coordinators); District Trainers (program coordinators trained SPED teachers)	NA
Kunnavatana et al. (2013a)	-	TBFA	-	4 SPED teachers	Not specified	NA
Mckeney et al. (2013)	-	FA	-	3 GE teachers	Researcher (University setting)	NA
Loman et al. (2014)	Desc. FBA	-	BIP	12 school professionals with flexible roles (2 principals, 1 vice principal/teacher, 7 Counselor, 2 learning specialist)	Researcher (University setting)	NA

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Trainees	Trainers	Coaches/ Consultants
Pence et al. (2014)	-	TBFA	-	6 SPED teachers (teacher trainees)	Behavior analysts (not specified; trained teacher trainers); teacher trainers (trained teacher trainees)	NA
Lane et al. (2015)	Desc. FBA	-	BIP	48 (10 GE, 16 SPED, 2 ADMIN; 17 did not complete demo)	Researcher (University setting)	Coaches (district-level)
Rispoli et al. (2015)	-	TBFA	-	3 headstart teachers, 1 headstart teaching assistant	Researcher (University setting)	Researcher (University setting)
Strickland-Cohen et al. (2015)	-		BIP	13 school professionals (3 SPED teachers, 3 counselors, 3 school psychologist, 2 learning specialist, 1 autism specialist, 1 behavior specialist)	Researcher (University setting)	NA
Flynn et al. (2016)	-	TBFA	BIP	3 SPED teachers	Researcher (University setting)	NA
Rispoli et al. (2016)	-	FA, TBFA	-	6 SPED teachers and 1 special education district coordinator	Researcher (University setting)	NA

Note: ADMIN = administrator, ASD = autism spectrum disorder, BIP = behavior intervention plan, FA = functional analysis, FBA = functional behavior assessment, GE = general education, NA = not-applicable, SP = speech pathologist, SPED = special education, and TBFA = trial-based functional analysis.

Table 3.
Training characteristics

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Training Dosage	Training Location	Training Format
Moore et al. (2002)	-	FA	-	1 day to read protocols; 5 min sessions	School (teacher's classroom)	1:1
Wallace et al. (2004)	-	FA	-	3 hr workshop	Workshop (not specified); generalization probes (school, classroom)	Group, 1:1
Codding et al. (2005)	-	-	BIP	Observations ranged 1-3 weeks (average 2.1), with on average 12 min of review and performance feedback (4-12 sessions)	Private school (classrooms)	1:1 consultation
Noell et al. (2005)	Desc. FBA	-	BIP	Consultation to complete FBA and design BIP: Thinning schedule to support implementation: First day to every other day until 100% integrity for 2 days, followed by weekly (average 5.2 weeks; range 4-6)	School	1:1 consultation
Erbas et al. (2006)	Desc. FBA	FA	-	Training (continued until teachers scored 90 on Quiz); Consultation meetings (three 15-30 meetings); performance feedback (10-15 times per FA); trained to criteria	School	Group, 1:1 coaching
Crone et al. (2007)	Desc. FBA	-	BIP	Cohort 1: 5-6 half day workshops (monthly or semimonthly during school year). Cohort 2: 2-day (7 hr) training prior to school year	Off-site (district administration building)	workshop: group; team consultation: on-site
Browning-Wright et al. (2007)	-	-	BIP	Two 6-hr trainings	NS	Group
Dukes et al. (2008)	Desc. FBA	-	BIP	Three 7-hr training (2 full day, six-week break, final training)	NS	Group
Kraemer et al. (2008)	-	-	BIP	1 6-hr training	NS	Group

Renshaw et al. (2008)	Desc. FBA	-	BIP	Four 4-hr long training over 10-weeks with independent readings (n=10, 1-5 pp), applied activities (1 per week), and individual consultation (n=2, 5-15 min)	After school	Group, 1:1
Machalicek et al. (2010)	-	FA	-	Trained to criterion (5 min FA sessions; training lasting average 75 min (range 60-95)	Remote: video supervision	1:1
Chok et al. (2012)	-	FA	BIP	10.5 to 12.5 hrs	School	Group, 1:1, coaching
Christensen et al. (2012)	Desc. FBA	-	BIP	Study 1) Four 4-hr long training over 10-weeks with independent readings (n=10, 1-5 pp), applied activities (1 per week), and individual consultation (n=2, 5-30 min); Study 2) 3 independent study guides, group discussions, and applied assignments; Study 3: independent review of Study 2's study guides and completion of 10 applied assignments and consultation session	After school	1:1
Ward-Horner et al. (2012)	-	FA	-	Direct Instruction, three 5-min training videos, 5-min rehearsal, training sessions (2 5-min sessions per condition), additional training for conditions with <90% accuracy	School (functional analysis room)	1:1
Bethune et al. (2013)	Desc. FBA		BIP	Workshop (1 day, 6 hr in-service); coaching 5-10 min pre-observation 10 min coaching followed by <5 min feedback; coaching lasted until teachers scored 90% accuracy on two consecutive sessions	School (multiple locations)	Group, 1:1
Kunnavatana et al. (2013a)	-	TBFA	-	2-hr training	Conference room (provided by district); Schools (baseline and in situ sessions in classrooms)	Group, 1:1, coaching
Kunnavatana et al. (2013b)	-	TBFA	-	1-hr training, 20-min small group practice, 5 test rotations	Off-site: conference room provided by the school district.	Group
Mckeney et al. (2013)	-	FA	-	Training (not specified); FA session (15 min in duration and cont. until stable across three points)	School (classroom)	1:1
Loman et al. (2014)	Desc. FBA	-	BIP	Four 1-hr trainings	NS	Group, 1:1
Pence et al. (2014)	-	TBFA	-	Trainers: Workshop (NS) Pre-training refresher (90 min); Trainees: role plays (5 min each) feedback (<2 min), overall (1.5 -2 hours)	School (library, classroom)	Group, 1:1

Lane et al. (2015)	Desc. FBA	-	BIP	4-day training series with planned activities during and after each training series (spread out over year)	District, School, remote (phone conversations, email)	Group, coaching
Rispoli et al. (2015)	-	TBFA	-	60 min presentation (PowerPoint and video); post-training probes with <3 min feedback to criterion (100% fidelity across three conditions); classroom probes (<2 min feedback)	School (teacher work room, classroom)	1:1
Strickland-Cohen et al. (2015)	-		BIP	Four 1-hr trainings over four weeks	NS	Group
Flynn et al. (2016)	-	TBFA	BIP	TBFA Training 2-hr, TBFA Feedback sessions (5 min each); DRA Training 1 hr; Implementation with feedback: 3–5 days per week (45 min sessions) for a total of 8 weeks	School (classroom)	1:1
Rispoli et al. (2016)	-	FA, TBFA	-	45-min training	School (classroom)	1:1

Note: BIP = behavior intervention plan, FA = functional analysis, FBA = functional behavior assessment, NS = not specified, and TBFA = trial-based functional analysis.

Table 4.
Study characteristics

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Experimental Design	IV	DV	TI	SV
Moore et al. (2002)	-	FA	-	MBD across subjects	FA Training	Percentage of correct teacher responses	TI of training NS	Discussed
Wallace et al. (2004)	-	FA	-	MBD across subjects	FA workshop	Percent of correct for each session	TI of training NS	Discussed
Codding et al. (2005)	-	-	BIP	Concurrent MBD across teacher–student dyads	Performance feedback on behavior support plan	Percentage of correct implementation	TI of training NS	Discussed, SV measure
Noell et al. (2005)	Desc. FBA	-	BIP	3-by-3 split-plot analysis with factors for time (week of the treatment trial) and condition	Consultation (three conditions) to support implementation of treatment implementation	TI (teacher's implementation of intervention plan)	Procedural guides, checklists, interview forms and checklists for meetings, activity date log, & monitored by lead authors	Discussed, SV measure
Erbas et al. (2006)	Desc. FBA	FA	-	Multiple probe design	Functional analysis training program	Percent correct responding	Planed Steps	Discussed, SV measure
Crone et al. (2007)	Desc. FBA	-	BIP	Pre/Post	Training and consultation in FBA and BSP	knowledge, implementation, SV	TI of training NS	Discussed, SV measure
Browning-Wright et al. (2007)	-	-	BIP	Pre/Post	Training on how to evaluate and rate quality of positive behavior support plan	Behavior Support Plan-Quality Evaluation Guide (BSP-QE)	TI of training NS	Discussed

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Experimental Design	IV	DV	TI	SV
Dukes et al. (2008)	Desc. FBA	-	BIP	Post-test only design (ANOVA)	FBA district training	Survey of Intervention Practices	TI of training NS	Discussed
Kraemer et al. (2008)	-	-	BIP	Pre/Post	Training on how to evaluate and rate quality of positive behavior support plan	Behavior Support Plan-Quality Evaluation Guide (BSP-QE)	TI of training NS	Discussed
Renshaw et al. (2008)	Desc. FBA	-	BIP	(1) Modified multiple-baseline achievement test (teacher IV), A-B (student IV; distal measure of training); (2) ABAB (student IV);	multi-component function-based support training	knowledge test, student's behavior outcome (distal)	TI of training NS	Discussed, SV measure
Machalicek et al. (2010)	-	FA	-	multiple baseline across participants	Performance feedback via video-tele-conferencing	steps completed correctly	Checklist	Discussed, SV measure
Chok et al. (2012)	-	FA	BIP	Concurrent MBD across subjects	Training program on functional analysis and treatment development	accuracy: (a) conducting FA sessions, (b) interpreting graphs, (c) responding to undifferentiated FA data response, and (d) selecting interventions	Planed Steps	Discussed
Christensen et al. (2012)	Desc. FBA	-	BIP	(1) Modified multiple-baseline achievement test	multi-component function-based support training	knowledge test, student's behavior outcome (distal)	TI of training NS	Discussed, SV measure

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Experimental Design	IV	DV	TI	SV
				(teacher IV), A-B (student IV; distal measure of training); (2) ABAB (student IV); (3) training not evaluated, ABAB (student IV)				
Ward-Horner et al. (2012)	-	FA	-	Alternating treatment design (ABC, ABCD)	Behavior skills training in FA using video modeling, rehearsal, and feedback	percentage of correct responses during the functional analysis conditions: attention, play, demand	Correct implementation of modeling, rehearsal, and feedback training	Discussed, SV measure
Bethune et al. (2013)	Desc. FBA		BIP	Delayed MBD across students	In-service and coaching on functional assessment and function-based interventions	percent accuracy of implementation, (distal measures: student's problem behavior, student's replacement behavior)	Checklist	Discussed, SV measure
Kunnavatana et al. (2013a)	-	TBFA	-	MBD across teachers	In-service training on TBFA	procedural integrity conducting FA trials, accuracy graphing data, accuracy analyzing data	TI of training NS	Discussed
Kunnavatana et al. (2013b)	-	TBFA	-	MBD across participants (FA steps); AB design	Pyramid training on TBFA	accuracy: conducting FA in classroom, role	TI of training NS	Discussed

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Experimental Design	IV	DV	TI	SV
				(Graphing and analyzing data)		play data, graph and analyzing data		
Mckeney et al. (2013)	-	FA	-	Non-concurrent multiple baseline design across participants	Teacher FA training with consultation	Procedural fidelity of correct steps per FA session	TI of training NS	Discussed, Survey
Loman et al. (2014)	Desc. FBA	-	BIP	Pre/Post	Basic functional assessment training	Knowledge assessment, functional assessment procedural adequacy checklist	Checklist	Discussed, SV time log,
Pence et al. (2014)	-	TBFA	-	MBD across subjects	Pyramid training on FA	Procedural fidelity of implementation of FA conditions	TI of training NS	Discussed
Lane et al. (2015)	Desc. FBA	-	BIP	Pre/Post	Professional development training series on FABI	Perceived knowledge, perceived confidence, perceived usefulness, actual knowledge	TI of training NS	Discussed, Item: Perceived Useful is a measure of social validity; discussed
Rispoli et al. (2015)	-	TBFA	-	Concurrent multiple baseline design across teachers	TBFA Training package	TBFA implementation fidelity	Planed Steps	Discussed, SV measure
Strickland-Cohen et al. (2015)	-		BIP	Pre/Post	Behavior Support Plan Training	Knowledge Test, BSP Critical features checklist, Contextual fit rating scale,	TI of training NS	Discussed, SV measure

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Experimental Design	IV	DV	TI	SV
						fidelity of implementation, (Direct observation of student behavior; distal measure)		
Flynn et al. (2016)	-	TBFA	BIP	Multi-element design (Student behavior, multiple baseline design; distal measure)	Training package on TBFA and DRA	Teacher's procedural fidelity during both TBFA and DRA sessions; (student challenging behavior, student replacement behavior; distal measures)	Checklist	Discussed, SV measure
Rispoli et al. (2016)	-	FA, TBFA	-	MBD across participants	TBFA Training package	FA Implementation Fidelity, number of sessions required to reach 100% fidelity criterion, duration of role play and performance feedback session to reach criterion	Planed Steps	Discussed, SV measure

Note: BIP = behavior intervention plan, BSP = behavior support plan, BSP-QE = Behavior Support Plan-Quality Evaluation Guide, Desc. FBA = descriptive functional behavior assessment, DV = dependent variable, FA = functional analysis, IV = independent variable, MBD = multiple baseline design, NS = not specified, SV = social validity, TBFA = trial-based functional analysis, and TI = treatment integrity.

Table 5.
Training techniques

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Written Materials	Direct Instruction	Feedback	Practice	Role Play	Praise or Reinforcement	Video (Instruction, Model)	Trained to Criterion	In-person Model	Check for understanding	Consultation	Practice-based learning	Step Checklist	Formative Assessment	Rehearsal	Summative Assessment	Coaching	Pyramid Training	Error Correction	Prompting
Moore et al. (2002)	-	FA	-	X	-	X	X	X	X	-	-		X	-	-	-	-	X	-	-	-	-	-
Wallace et al. (2004)	-	FA	-	X	X	X	X	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Codding et al. (2005)	-	-	BIP	X	-	X	-	-	X	-	-	X	X	X	-	-	-	-	-	-	-	-	-
Noell et al. (2005)	Desc. FBA	-	BIP	-		X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Erbas et al. (2006)	Desc. FBA	FA	-	X	X	X	X	-	X	X	X	-	X	X	X	-	X	-	X	-	-	-	-
Crone et al. (2007)	Desc. FBA	-	BIP	-	X	X	X	-	-	-	-	X	-	X	X	-	-	-	-	-	-	-	-
Browning-Wright et al. (2007)	-	-	BIP	X	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dukes et al. (2008)	Desc. FBA	-	BIP	X	X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Kraemer et al. (2008)	-	-	BIP	X	X	X	X	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
Renshaw et al. (2008)	Desc. FBA	-	BIP	X	X	X	X	-	-	-	-	-	-	X	X	-	.	-	.	-	-	-	-
Machalicek et al. (2010)	-	FA	-	X	-	X	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	X	-
Chok et al. (2012)	-	FA	BIP	X	X	X	-	-	X	-	-	X	-	-	-	-	-	X	-	-	-	-	-
Christensen et al. (2012)	Desc. FBA	-	BIP	X	X	X	X	-	-	-	-	-	-	X	-	-	-	-	X	-	-	-	-

Article	Descriptive Functional Assessment Training	FA/ TBFA training	BIP Training	Written Materials	Direct Instruction	Feedback	Practice	Role Play	Praise or Reinforcement	Video (Instruction, Model)	Trained to Criterion	In-person Model	Check for understanding	Consultation	Practice-based learning	Step Checklist	Formative Assessment	Rehearsal	Summative Assessment	Coaching	Pyramid Training	Error Correction	Prompting
Ward-Horner et al. (2012)	-	FA	-	X	X	X	X	-	X	X	-	-	-	-	-	-	X	X	-	-	-	-	-
Bethune et al. (2013)	Desc. FBA		BIP	X	X	X	-	-	-	-	X	X	-	-	-	-	-	-	-	X	-	-	-
Kunnavatana et al. (2013a)	-	TBFA	-	X	X	X	X	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Kunnavatana et al. (2013b)	-	TBFA	-	X	X	X	X	X	-	X	X	-	-	-	-	-	-	-	-	-	X	-	-
Mckeney et al. (2013)	-	FA	-	X	X	X	X	-	-	X	X	-	X	X	-	-	-	-	-	-	-	-	-
Loman et al. (2014)	Desc. FBA	-	BIP	X	X	X	X	X	-	X	-	X	X	-	X	-	X	-	-	-	-	-	-
Pence et al. (2014)	-	TBFA	-	X	X	X	X	X	X	-	X	X	-	-	-	-	-	-	-	-	X	-	-
Lane et al. (2015)	Desc. FBA	-	BIP	X	X	X	X	-	X	-	-	-	X	-	X	X	-	-	-	X	-	-	-
Rispoli et al. (2015)	-	TBFA	-	X	X	X	X	X	X	X	X	X	-	-	-	X	-	-	-	X	-	X	X
Strickland-Cohen et al. (2015)	-		BIP	X	X	X	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
Flynn et al. (2016)	-	TBFA	BIP	X	X	X	X	X	X	X	X	X	X	-	-	X	-	-	-	-	-	-	-
Rispoli et al. (2016)	-	FA, TBFA	-	X	X	X	X	X	X	X	X	-	-	-	-	X	-	-	-	-	-	-	-
Total				23	21	23	20	12	12	10	9	8	8	5	5	5	4	3	2	2	2	2	1

Note: BIP = behavior intervention plan, Desc. FBA = descriptive functional behavior assessment, FA = functional analysis, and TBFA = trial-based functional analysis.

Table 6.
Training Content

Article	Descriptive Functional Assessment Training	FA/TBFA training	BIP Training	Function	FA	BIP/Behavior Change	Replacement Behavior	Descriptive Procedures	ABA	Evaluation/Monitoring	Interviews	Visual Analysis	ODB	Measurement	Target Behavior	ABC Direct Observation	Problem Solving	SCRD	Record Review	Behavior Dimensions	Rating Scales	Treatment Integrity	Social Validity	Ethics
Moore et al. (2002)	-	FA	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wallace et al. (2004)	-	FA	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Codding et al. (2005)	-	-	BIP	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Noell et al. (2005)	Desc. FBA	-	BIP	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbas et al. (2006)	Desc. FBA	FA	-	X	X	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Crone et al. (2007)	Desc. FBA	-	BIP	-	-	X	-	X	-	X	X	-	X	-	-	-	X	-	-	-	-	-	-	-
Browning-Wright et al. (2007)	-	-	BIP	X	-	X	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dukes et al. (2008)	Desc. FBA	-	BIP	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kraemer et al. (2008)	-	-	BIP	X	-	X	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Renshaw et al. (2008)	Desc. FBA	-	BIP	X	-	X	X	X	-	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-
Machalicek et al. (2010)	-	FA	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chok et al. (2012)	-	FA	BIP	-	X	X	-	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-
Christensen et al. (2012)	Desc. FBA	-	BIP	X	-	X	X	X	-	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-

Article	Descriptive Functional Assessment Training	FA/TBFA training	BIP Training	Function	FA	BIP/Behavior Change	Replacement Behavior	Descriptive Procedures	ABA	Evaluation/Monitoring	Interviews	Visual Analysis	ODB	Measurement	Target Behavior	ABC Direct Observation	Problem Solving	SCRD	Record Review	Behavior Dimensions	Rating Scales	Treatment Integrity	Social Validity	Ethics
Ward-Horner et al. (2012)	-	FA	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bethune et al. (2013)	Desc. FBA		BIP	X	-	X	X	X	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-
Kunnavatana et al. (2013a)	-	TBFA	-	X	X	-	-	-	X	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Kunnavatana et al. (2013b)	-	TBFA	-	X	X	-	-	-	X	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Mckeney et al. (2013)	-	FA	-	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-
Loman et al. (2014)	Desc. FBA	-	BIP	X	-	X	-	X	-	-	X	-	X	-	-	X	-	-	-	-	-	-	-	-
Pence et al. (2014)	-	TBFA	-	-	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Lane et al. (2015)	Desc. FBA	-	BIP	X	-	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
Rispoli et al. (2015)	-	TBFA	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strickland-Cohen et al. (2015)	-		BIP	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flynn et al. (2016)	-	TBFA	BIP	X	X	X	X	-	-	-	-	X	-	X	X	-	-	-	-	-	-	-	-	-
Rispoli et al. (2016)	-	FA, TBFA	-	X	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total				14	13	12	9	8	7	7	7	7	7	6	6	4	2	1	1	1	1	1	1	1

Note: Note: BIP = behavior intervention plan, Desc. FBA = descriptive functional behavior assessment, FA = functional analysis, and TBFA = trial-based functional analysis.

Chapter 3:

Data Article

Building Site-Level Capacity for Functional Assessment-based Interventions: Outcomes of a Professional Learning Series

Functional assessment-based interventions (FABIs) are designed based on the reasons *why* challenging behaviors occur and teach new behaviors to support students' achievement of meaningful experiences inside and outside of the classroom context. Umbreit, Ferro, Liaupsin, and Lane (2007) developed a systematic approach for conducting functional behavior assessments to identify maintaining function(s) of target behaviors based on the reason(s) why challenging behaviors occur to design a behavior intervention plan (BIP) for a specific student in a specified environment. Functional approaches to intervention frequently (a) teach functionally equivalent replacement behaviors (and as appropriate other skills deficits) and/or (b) make environmental adjustments such as adjusting the antecedents that occasion behavior and/or the consequences following a behavior. Using the Umbreit model, graphic organizers are used to assist teams to determine function (using the *function matrix)*, determine intervention focus (using the *function-based intervention decision model*), and build interventions (using *A-R-E components*; described subsequently). Based on function and intervention focus, antecedent adjustments, reinforcement adjustments, and extinction procedures are developed within the BIP to make the challenging behavior less likely and a replacement behavior more likely to occur. FABIs have been widely used to promote school engagement and social-emotional competencies, and reduce problem behavior (What Works Clearinghouse; WWC, 2016).

For more than 60 years, researchers, behavior analysts and other professionals have used behavior analytic technologies to design and implement function assessment-based interventions (Aylonn & Michael, 1959; Skinner, 1953). To discern function prior to intervention design and intervention, *functional assessment* processes are employed to identify functional relation(s) between one or more behaviors and an environmental event (Kates-McElrath, Agnew, Axelrod, & Bloh, 2007). Functional assessment procedures include both experimental (i.e., functional analysis) and descriptive (e.g., indirect and direct assessment) procedures. Recently, the scaling up of functional approaches to assessment and intervention have occurred in educational settings (Anderson, Rodriquez, & Campbell, 2015).

Use of functional assessment in schools has been conceptualized as an effective and proactive Tier 3 support under three-tiered models of prevention (e.g., comprehensive, integrated three-tiered model of prevention [Ci3T], n.d.; Positive Behavior Interventions and Supports [PBIS], n.d.; Horner & Sugai, 2015). However, it is only required by law for students receiving special education services and only in response to disciplinary changes in placement when the conduct in question is a manifestation of the student’s disability (Individuals with Disabilities Education Improvement Act [IDEA], 2004; § 1415[k][1][F][i]–[ii]). Despite growing legislation, technical assistance, and research promoting functional approaches to assessment and intervention in educational settings (Collins & Zirkel, 2017; von Ravensberg, & Blakely, 2014), there remains disagreement on which assessment-based procedures are most appropriate for school settings. This problem is complicated by the fact that neither descriptive approaches to functional behavior assessment nor experimental approaches, such as functional analysis have a single developer or manual to guide efforts in identifying functional relations between students’ behavior and environment to inform the development of BIP (WWC, 2016). Rather, behavior analysts and researchers have developed a range of procedures and materials to support a wide range of functional assessment technologies. For example, experimental functional assessment procedures include traditional and trial-based functional analysis (Iwata Dorsey, Slifer, Bauman, & Richman, 1982/1994; Sigafoos & Saggers, 1995). In contrast, descriptive functional assessment procedures include indirect (e.g., interview protocols, survey instruments) and direct (e.g., observational tools) techniques (Dunlap et al., 1993; Kern, Dunlap, Clarke, & Childs, 1994; O’Neill, Albin, Storey, Horner, & Sprague, 2015). To support the systematic process of coordinating the functional behavior assessment and BIP, guidance documents and tools have also been developed for use. These tools help organize the functional behavior assessment process and support taking information garnered from the functional assessment to develop a hypothesis statement, and link the results of the functional assessment to the intervention (Umbreit et al., 2007).

In recent years, there has been increased attention and focus on improving the applicability and dissemination of procedures to promote implementation of FABI by individuals other than behavior analysts (McCahill, Healy, Lydon, & Ramey, 2014). Yet there is no consensus on (a) which school personnel should be included and/or are qualified to conduct functional assessment in school settings and (b) whether such efforts should be led by individuals or through team-based approaches (Collins & Zirkel, 2017). Restricting functional assessment to a set of procedures that must be implemented by an isolated few (“experts”) overlooks the wealth of information obtained from school personnel with whom the student most regularly interacts (Collins & Zirkel, 2017; Scott & Eber, 2003). Not surprisingly, some educators report not yet having the skills necessary to coordinate functional assessment procedures nor how to apply its results to their design, implementation, and evaluation of FABIs in supporting actual students (Scott, Liaupsin, Nelson, & McIntyre, 2005; Van Acker, Boreson, Gable, & Potterton, 2005).

A Systematic Approach to Functional Assessment-based Interventions

Umbreit and colleagues (2007) developed one systematic approach to support educators identify maintaining function(s) of target behaviors and design interventions (i.e., BIP) directly linked to results of the functional behavior assessment. The Umbreit model includes unique features to assist practitioners. These tools include the *function matrix, function-based intervention decision model*, and *antecedent-reinforcement-extinction (A-R-E) components*.

Function matrix. The function matrix is a graphic organizer used to analyze whether challenging behaviors are maintained by positive reinforcement (access) or negative reinforcement (escape/avoidance), with individuals seeking or avoiding attention, activities or tangibles, and/or sensory stimuli (Umbreit et al., 2007). Information garnered during the functional behavior assessment is analyzed, sorted by function, and entered in one or more of the six respective cells. For example, if information from the teacher interview indicated the target behaviors occurs during independent and challenging assignments (work demand) and after engaging in the target behavior the student is sent to the resource room (escape demand), this information would be placed in the corresponding cell of the function matrix for negative reinforcement: activities/tangibles (Umbreit & Ferro, 2014). The function matrix can be used to summarize a wide range of data to help develop a functional hypothesis statement by identifying which cell or cells within the function matrix holds the most functional assessment data.

Function-based intervention decision model. The function-based intervention decision model is used to select the intervention focus. To appropriately select one of three intervention methods or one hybrid method, two key questions are asked: *Can the student perform the replacement behavior?* and *Do antecedent conditions represent effective practices?* These questions help identify which intervention method to focus on during the design and implementation of the BIP. *Method 1: Teach the replacement behavior* is used when the replacement behavior is not in the student's repertoire (acquisition deficit). *Method 2: Improve the environment* is used when the student has the replacement behavior in his or her repertoire, yet the antecedent conditions preceding the behavior may not offer the most effective conditions for preventing the target behavior and/or eliciting the replacement behavior for this student. *Method 3: Adjust the contingencies* is used when the replacement behavior is in the student's repertoire and antecedent conditions represent sufficiently effective practices. In this case, shifts to decrease the rate of reinforcement for the target behavior and to increase the rate of reinforcement for the replacement behavior are needed. Finally, there is a combination of *Methods 1 and 2: Teaching the replacement behavior and improving the environment.*

Antecedent-reinforcement-extinction (A-R-E) components. A-R-E components are used to support the intervention method identified using the function-based intervention decision model. Based on function and method, each intervention includes *Antecedent-Reinforcement-Extinction components*: antecedent (A) adjustments, reinforcement (R) adjustments, and extinction (E) procedures. Antecedent adjustments are programmed to target variables that occur in the environment to make the problem behavior less likely and make the replacement behavior more likely (Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991). Likewise, the consequences following the target and/or replacement behavior can be manipulated to reinforce the replacement behavior and extinguish the problem behavior. Specially, reinforcement adjustments are programmed to provide (a) consequences which will reinforce the replacement behavior and/or (b) the same consequences that previously reinforced the target behavior, but only for the replacement behavior. Extinction procedures are also programmed to withhold the consequence that previously reinforced the problem behavior when the problem behavior occurs (Iwata, Pace, Cowdery, & Miltenberger, 1994; Janney, Umbreit, Ferro, Liaupsin, & Lane, 2012). A-R-E components can be used to either teach the replacement behavior, improve the environment, or adjust the contingencies (or a combination of teach the behavior and improve the environment). FABI innovations, such as the Umbreit model (2007), offers practitioners the technologies to design, implement, and evaluate FABI in real-world settings.

Practitioner-led Functional Assessment-based Interventions

In a recent review of the literature, Common, Lane, Pustejovsky, Johnson, and Johl (2017) identified 18 studies examining the Umbreit model to support students with and at-risk for high incidence disabilities. Across all studies, the BIP was implemented by a classroom teacher with university support to conduct the functional behavior assessment. In one study, teachers were trained during a six-hour summer learning series to learn principles of applied behavior analysis and the FABI model (Lane, Weisenbach, Little, Phillips, & Wehby, 2006). During the school year, university-based liaisons met with the classroom teachers for one-hour per week to support educators to design, implement, and evaluate a FABI for two students who were identified as at-risk for developing persistent behavioral challenges. In a special issue of *Beyond Behavior*, Lane, Oakes, and Cox (2011) partnered pre-service special educators as part of their graduate training with classroom teachers and offered four illustrations of conducting FABI across the K-12 continuum: two at the elementary level (Aitken et al., 2011; Germer et al., 2011), one at the middle school level (Cox et al., 2011) and one at the high school level (Majeika et al., 2011). Across studies, graduate students in special education worked in collaboration with the classroom teacher to coordinate the functional behavior assessment and BIP process following the Umbreit model (Umbreit & Ferro, 2014).

Beyond the challenge of identifying which functional approach to assessment to use in schools, challenges have also been noted in training in-service educators. Scott et al. (2005) proposed FABI methods should be adapted and grounded in procedures which are able to be sustained in school settings by empowering school personnel with the knowledge and repertoire of behaviors needed, while at the same time balancing practicality with rigor.

Professional Development in Practitioner-led Functional Assessment-based Interventions

Practice-based professional learning (PBPL; Ball & Cohen, 1999) is one instructional approach to help balance knowledge acquisition (e.g., theory) with skill acquisition (e.g., behavior repertoire) by encouraging teachers to apply their developing knowledge base to real-world issues and dilemmas related to their actual teaching and classroom environment (Levin, Hibbard, & Rock, 2002). PBPL employs active learning and supported practice to facilitate learners' integration of theory and practice (Leko & Brownell, 2009). Rather than teaching discrete units of content separately (e.g., principles of behavior, measurement, experimental design) using traditional direct instruction; learners apply content (knowledge) and action (skills) to solve real-world problems by working in small collaborative groups while learning relevant information which they are directly able to apply to their practice (Barrows & Tamblyn, 1980). Unlike other approaches to professional development, which focus solely on practitioners' knowledge of practice, PBPL focuses on practitioners' knowledge and application of skills regarding effective educational practice (e.g., designing, implementing, and evaluating FABI).

Learning the necessary skillset to design, implement, and evaluate FABIs is well aligned with PBPL. FABIs are a recommended team-based practice (Collins & Zirkel, 2017), which requires a combination of knowledge and practice, including basic concepts and principles of behavior, behavior assessment, behavior-change procedures, measurement, experimental design, data display, and interpretation (Behavior Analysis Certification Board; BACB, 2017). Rather than teaching these skills in isolation, PBPL empowers learners to integrate theory and practice while employing a broad repertoire of knowledge, theory, and behaviors (e.g., principles of behavior) to real-world problems (e.g., supporting students with challenging behavior).

To date, there is ample evidence to suggest FABIs can be taught and led by teachers with limited university support. For example, two research teams have incorporated the Umbreit model and integrated PBPL to train educators who then directly apply their new skills to directly supporting a student as part of the learning experience: Lane (Lane, Barton-Arwood, Spencer, & Kalberg, 2007; Lane et al., 2015, Oakes et al., 2017) and Christensen (Christensen, Renshaw, Caldarella, & Young, 2012; Renshaw, Christensen, Marchant, & Anderson, 2008).

Lane and colleagues (2007) first examined how to support in-service teachers to learn how to design, implement, and evaluate a FABI using the Umbreit model. Four teams attended a university professional learning series that included (a) three 6-hr sessions and (b) 1-hr onsite meetings twice per month (range: 28-30 hrs). Each team selected one student to support, two cases were offered and include student outcome data, treatment integrity data of intervention, and pre and post social validity data. Findings offer initial evidence to suggest that with training and coaching support, in-service practitioners can implement FABI with fidelity and produce positive student outcomes. Both cases suggested a functional relation between intervention package and changes in student outcome measure (e.g., target or replacement behavior). Social validity ratings provided by students, teachers, and one parent suggested favorable perceptions. Yet this study did not examine the extent to which participants learned concepts and strategies addressed in the professional learning series.

Lane and colleagues (Lane et al., 2015; Oakes et al., 2017) expanded their initial research in practitioner-led FABI training and formed university-district partnerships to refine their practice-based professional learning series. Concepts and strategies taught and applied across professional learning series were grounded in applied behavior analysis and the Umbreit model to FABI (Umbreit et al., 2007; Umbreit & Ferro, 2014). Teams were taught a five-step process: *Step 1: Identifying students who need a FABI*; *Step 2: Conducting the functional assessment*; *Step 3: Collecting baseline data*; *Step 4: Designing the intervention*; and *Step 5: Testing the* *intervention.* After each session, teams worked with a district coach to complete each step of the FABI process to support an actual student in the classroom of a teacher who was also a team member. To examine the effects of the professional learning series, participants completed pre and post training surveys to evaluate their perceived knowledge, confidence, and usefulness (KCU) as well as actual knowledge of 15 concepts and strategies addressed in the professional learning series (Barton-Arwood, Morrow, Lane, & Jolivette, 2005; Borthwick-Duffy, Lane, & Mahdavi, 2002). Across professional learning series, statistically significant improvements in each concept and strategy were demonstrated (Lane et al., 2015; Oakes et al., 2017). Across studies, results suggest statistically significant improvements in participants' KCU of FABI strategies and concepts taught.

Similarly, Christensen and colleagues (Christensen et al., 2012; Renshaw et al., 2008) trained general education teachers to independently implement function-based interventions with limited university support. In the first study, Renshaw et al. (2008) trained four general education elementary school teachers to implement FABI with one at-risk student from their respective classrooms. Training procedures were adapted from Umbreit et al. (2007) and included group training, independent readings, applied activities, and consultation. Over a 10-week period, teachers learned the rationale, principles, and procedures of FABI across four one-hr training sessions, independent readings, and applied activities. Five applied activities were related to completing the functional behavior assessment process and five activities were related to the BIP. Results indicated that the training was effective in fostering teachers' successful application of the Umbreit model and demonstrated positive changes related to student outcomes.

Christensen et al. (2012) extended Renshaw et al. (2008) original study and offered three interrelated studies to (a) replicate Renshaw et al.'s original training and implementation procedures (study 1), and (b) extend investigations using more rigorous data evaluation techniques and fading research support from research personnel (studies 2 and 3). Five teachers participated in the initial training (study 1); of which, two teachers received additional training (study 2); of which one teacher received additional training in study 3. Results across the three studies are reported for the one teacher who participated in all three opportunities. Across studies, Christen and colleagues, (a) demonstrated a functional relation between each professional learning opportunity and gains in teachers' knowledge and (b) and offer cases to illustrate desired changes in student's behavior following implementation of behavior support. Collectively, these five studies (Christensen et al., 2012; Lane et al., 2007; Lane et al., 2015; Oakes et al., 2017; Renshaw et al., 2008) demonstrate educators can learn to design, implement, and evaluate FABIs as part of PBPL with varying degrees of university support. The research object for the field now shifts to questions pertaining to scalability (reference implementation sciences literature here).

Purpose

Thus, this study extends the work of PBPL by examining professional development utilizing practitioner-led team-based approaches to FABI utilizing the Umbreit model with limited university support. This study builds upon the previous work of Lane and colleagues by examining educator-level (trainee) and student-level outcomes. The following research objectives and subsequent questions guided our investigation examining differences across three cohorts receiving training either from university personnel (Cohort A) or state technical assistance providers (Cohorts B and C):

Research Objective 1: To explore procedural integrity of the professional learning series: (capturing what happened within and across each session) and describe stakeholders' experiences. This included questions related to trainers' procedural integrity with which trainers across the three cohorts conducted each of the five sessions, trainees' and coaches' participation and engagement within trainings, attendance of team members and district coaches, as well as coaching activities. Differences between cohorts were explored.

Research Objective 2: To explore FABI team progress and trainees' learning outcomes, including a description of the students with whom they supported. This included questions related to (a) trainees' learning within each session, (b) FABI teams' progression across the five steps, and (c) trainees' learning from start to finish. Differences between cohorts were also explored.

Research Objective 3: To explore student outcomes associated with FABI teams designing, implementing, and evaluating a FABI as part of applied learning activities associated with the professional learning series. This included a question related to the extent teams demonstrated a functional relation between the introduction of the independent variables and changes in student performance. Differences between cohorts were also explored.

It was hypothesized (a) the training would be implemented with integrity across university and state trainers, (b) district coaches would meet regularly with teams, (c) the KCU survey would have adequate internal consistency, (d) participants would demonstrated increased knowledge (actual and perceived), confidence, and usefulness of FABI procedures between and across training days, (e) teams would complete the functional behavior assessment and some would complete the BIP, and (f) of the teams who completed and introduced the BIP, the majority would demonstrate a functional relation regarding improved student outcomes. Across research questions we hypothesized there would be nominal differences between trainees across cohorts trained by either university or district personnel (see Appendix 1 for specific research questions and their hypotheses organized by research objective).

Method

Participants and Setting

FABI Team members (trainees). Trainee participants included 342 educators attending a professional development professional learning series hosted by a state technical assistance provider. Educators represented school-teams from a single district in a large city. Of the trainees who completed demographics, trainees were predominately female (n = 285; 84.82%). Related service providers (n = 134; 39.41%). and administrators (n = 74; 21.76%) comprised most of the group, with the remaining being general (n = 93; 27.35%) and special education teachers (n = 34; 10.00%), and other school personnel (n = 5; 1.47%). Most teachers taught at the elementary level, with early childhood and secondary levels also represented by classroom teachers. Participants were highly educated, with 81.60% of trainees holding a master's degree or higher. The majority of trainees were certified in their current assignment (*n* = 125; 99.21%) and a small number were board certified behavior analysis (BCBA; *n* = 3; 0.92%; see Table 1). Seventy-six trainees were assigned to Cohort A, led by a University Trainer, 137 trainees were assigned to Cohort B (led by State Trainer), and 129 trainees were assigned to Cohort C (led by State Trainer; description of stratified random assignment to follow).

Trainers. Trainers included one university (hereby referred to as university trainer) and six state-level technical assistant providers (hereby referred to as state trainers). The university trainer was female, with a doctoral degree in special education and a doctoral designated Board Certified Behavior Analyst certification with the BACB. Members of the university research team had been involved in previous pre- and in-service professional development (e.g., Lane et al., 2011; Lane et al., 2015), including two doctoral level principle investigators (PI), and two graduate research assistants (i.e., special education master's and doctoral students). State trainers included six technical assistant providers. State trainers were all female. State trainers were highly educated with all six holding a Master's degree and being in their current position of provided technical assistance in the areas of Tier 3 behavior supports for the past three years. See Table 2 for more information.

District coaches. District coaches included 24 educators employed with the local school district. District coaches were predominately female (*n* = 22; 91.67%). District coaches were administrators (*n* = 8; 33.33%), related service providers (*n* = 6; 25.00%), or held other positions within the district (*n* = 10; 41.67%). Participants were highly educated with 87.5% of district coaches holding a master's degree or higher. For more information see Table 2.

Students. Trainees formed site-level FABI teams to support an actual student in a classroom of a participating trainee. Due to the nature of the student-support occurring across a partial yearlong professional training, teams FABI teams were asked to identify a student with high frequency but low to moderate in intensity challenging behavior to be supported as part of this learning experience. Sixty-seven students across 67 teams were identified and supported. Students were predominately male (n = 53; 81.46%) and receiving general education services (n = 38; 59.38%). Students' primary eligibility category for special education services is reported in Table 3. Student and school site teams represented elementary and secondary level classroom settings (see Table 3 for student's grade level). Participating students' FABI case characteristics are described in Table 4.

Setting. The participating school district was in the Midwestern region of the United States in a locale classified as a large city (National Center for Education Statitics, 2014-2015). The district included 89 schools during the training year. This included 50,947 students (34% White, 18% Black, 33% Hispanic, 14% Other), of which, 75.29 - 78.06% were economically disadvantaged. The district supported 8,807 students who were English langauge learners and 6,910 students with individualized education plans (National Center for Education Statitics, 2014-2015). The school district staffed approximately 4,473 full time equivalent teachers, and 2,902 other staff (National Center for Education Statitics, 2014-2015). Students represesented school sites across the kindergarten to twelfth-grade continuum. All trainings took place at a district facility with a large training room. For more district level information see Appendix 2.

Procedures

Approvals: University and district. The state technical assistance team contacted university researchers interested in professional development support activities around FABI. The state technical assistance team identified a district to partner with and the research team secured state technical assistance, district, and university approvals prior to proceeding. The state technical assistance team led registration. Prior to opening registration, all necessary approvals from the university, the state technical assistance provider, and the hosting district were secured. Seventy schools were invited to enroll in the professional learning series, 69 schools signed up for the professional learning series, of which two school site teams dropped from the professional learning series with plans to enroll the following year (see Appendices 3-7 for approval letters, information letter, and consent form).

Participants registered for the professional learning series as school-based teams. Each team supported one student during the series by applying each step of the FABI process with coaching support. Team could include up to 8 adults (actual range: 4-7) from each attending school (e.g., general education teacher, special education teacher, paraprofessional, school psychologist, parent, and administrator), of which, at least one team member was a classroom teacher of the supported student. Across teams, 342 educators representing 69 school building teams registered to attend the professional learning series. We used stratified random sampling procedure by assigning school teams to one of three training cohorts stratified by grade level (i.e., elementary, middle, secondary): Cohort A (led by university trainer; *n* = 76), Cohort B (led by state trainer *n* = 137), and Cohort C (led by state trainer *n* = 129). Each elementary, middle, or high school had an equal opportunity to be assigned to either Cohort A, B, or C at their grade level.

On the first day of training, registered participants received an informational letter describing the five-day Tier 3 behavior professional development professional learning series. The letter explained participation in the research aspect of the professional learning series was optional, and any materials completed and turned in over the course of the professional learning series granted permission for the research staff to collect and analyze data on any components of the professional learning series turned in. Submitted materials included (a) the pre, during, and post measures to evaluate the overall learning process along with demographic information and (b) information gathered during the training process related to the design, implementation, and evaluation of the FABI. Following random assignment, two teams encompassing 12 participants did not attend trainings following Day 2. One team had the parent withdraw from the study before Day 2 of training, the second team's student moved following Day 2. Both teams elected to withdraw from training with plans to enroll in the following year.

To secure parent/guardian permission, two copies of a parental consent form were sent home requesting permission for their child to participate in a FABI process prior to or shortly after the first training session. Parents were asked-depending on the age/maturity of their child, to discuss the research project and to see if their child was comfortable with participating. Parent/guardians consent letters were returned to their child's teacher or mailed to PI in an included pre-addressed and postage-paid envelope.

All information collected throughout the professional learning series was treated as confidential. We assigned training participants, state trainers, district coaches, and students identification numbers unrelated to district identification, and tagged by school initials. All pre and post professional learning series measures were completed via paper-and-pencil format (i.e., demographic information, *KCU survey*; descriptions to follow) and submitted directly to the research team. All formative assessments were completed electronically by adult participants (FABI team members) using clicker technology. FABI materials submitted by FABI teams related to the design, implementation, and evaluation of the FABI for the team's student included paper and electronic submissions. Formative assessment and FABI materials were submitted directly to state technical assistance providers or the district. The technical assistance team checked all materials submitted by teams related to the FABI to ensure they were deidentified prior to sharing electronically to researchers.

Professional learning series. School-site teams and district coaches attended a five-day professional learning series on how to design, implement, and evaluate FABIs. The five-day professional learning series was grounded in a practice- and team-based approach to facilitate (a) collective participation of educators within the same school with similar needs; (b) professional learning based on the characteristics, strengths, and needs of the student; (c) content knowledge needs of the training participants; (d) active learning and practice of new methods taught; (e) use of materials and other artifacts related to professional development consistent with materials used in the actual classroom outside of training; and (f) timely feedback on the performance while learning (Harris et al., 2012). The series was offered under the umbrella of Tier 3 supports. For an overview of the professional learning series see Appendix 8.

Across the series, teams learned a five-step systematic process to coordinate the functional behavior assessment and BIP (See Figure 1). These steps included: *Step 1: Identifying* *students who need a FABI; Step 2: Conducting the functional assessment; Step 3: Collecting baseline data; Step 4: Designing the intervention; Step 5: Testing the intervention*. Each day of the professional learning series focused on salient features of the FABI process, with an emphasis on theoretical, empirical, and practical issues related to this systematic approach. Concepts, strategies, and all practice-based learning applications were based on the model published by Umbreit and colleagues (2007) and were grounded in the principles of applied behavior analysis (Cooper, Heron & Heward, 2007).

For each step of the Umbreit model, participants received a checklist (described subsequently) developed by Lane and Oakes (2014) to guide teams through the FABI process. District coaches were provided checklists to monitor teams' progress and document their coaching. Teams worked through each checklist to complete each FABI step and turned in all documents to their assigned district coaches for review. District coaches used a modified checklist (described subsequently) as a coaching protocol to facilitate coaching.

Pre and post training. Information letters and pre-training measures (i.e., demographic and *KCU surveys*) were provided to all participants prior to or on the first day of training. State trainers completed pre-training measures at a planning meeting prior to the first day of training. District coaches and team members received and completed premeasure packets on the first day of training following a welcome and training overview. On the final day of training all participants completed a post training *KCU survey*. Participants were given 30 min on the first and last training day to complete pre and post training measures.

Within session. Within each training day, participants received (a) direct instruction in key concepts; (b) opportunities to practice and complete activities while receiving feedback from state trainers, research project staff, and district coaches; and (c) schedule logistics (e.g., interviews, observations, time with district coaches), as well as opportunities to enter and examine data while receiving feedback. Each training session occurred during regular contract hours (8:00 AM to 3:30 PM). Participants had 75 min for off-site lunch each day. Each training day opened with a welcome and introduction, followed by 10 min for teams to complete a brief formative assessment of acquisition of key concepts within each training session. Ten questions related to the content to be covered within the training session were posed to team members and answers were recording using TurningPoint polling software and clickers (Turning Technologies, 2017). Prior to wrapping up each day, these same questions were posed to the group again. Responses were monitored within and between training sessions to guide later training and coaching content. For training day agendas for each training day see Appendix 9. Team-based activities included (a) time to work on applied aspects of FABI; (b) brainstorming, question and answering, and coaching. Coaching within-session was provided by university and district trainers, research staff, and district coaches. The “parking lot” method was also used through the training series to document ideas and questions raised during each training day for the presenter to follow up on later. Parking lots (large sheets of paper) were hung on the walls and teams had sticky-note paper, pens, pencils, and highlighters at their team tables to write and post questions as needed.

Between session. Between sessions, team members worked at their school site to design, implement, and evaluate a FABI while working with their identified student. Next steps in terms of applied activities to complete between sessions were discussed at the end of each training day. District coaches also worked with teams at school sites to examine data, coach through the application of steps, model procedures, and provide feedback. Targeted coaching was provided to facilitate the process, including support with: (a) operationally defining target and replacement behaviors; (b) entering functional assessment data into the function matrix to determine the hypothesized functions; and (c) data collection, graphing, and interpretation.

Materials: Step Checklist, handouts, and coaching protocols. For each step, task analyses were provided to teams and coaches (checklists; see Appendix 10). Each checklist and coaching protocol specified items to complete within each step, and any handouts (materials; available at Ci3T.org) needed. Each Step Checklists was quantified and coded for step completion and step quality (described in professional learning series outcomes). Task analyses describing each step are described subsequently.

Step 1: Identifying students who need a FABI. In the first step, teams were taught how to identify students using schoolwide data (e.g., academic assessment data, behavior screening tools, office discipline referrals, attendance records) to determine which students may benefit from Tier 3 supports. These students may have either (a) not responded to Tier 1 or Tier 2 prevention efforts and/or (b) been identified directly for receiving FABI due to pronounced concerns (e.g., multiple risk factors as indicated across multiple data sources). Education records are often examined to look for patterns of behavior, duration of difficulties, and any interventions previously implemented. Teams concluded Step 1 by identifying a student to support for the duration of the FABI learning series. Step 1 included three items and one handout: *Referral Checklist* (Lane & Oakes, 2014).

Step 2: Conducting the functional assessment. In the second step, teams were taught how to conduct the functional behavior assessment to determine the hypothesized function(s) of the target behavior. Teams identify and select a target behavior (e.g., problem behavior) and perform a functional assessment using direct and indirect methodologies to determine the target behavior’s maintaining function(s). Teams begin by conducting a systematic review of school records and informal observations in the classroom. Next, teams identify and operationally define the target behavior during the teacher interview. The operational definition of the target behavior was taught to carry forward and be used throughout the duration of the functional behavior assessment. Teams then interview parent and student. Across interviews, teams obtain information about the student's strengths and needs as well as information on potential function(s) of the target behavior. Next, teams conduct a minimum of three hours of direct observation using A-B-C recording (Cooper et al., 2007) over a minimum of three observation sessions. In addition to interviews and observational data, rating scales were also used to identify acquisition (can’t do) and/or performance (won’t do) deficits from teacher and parent perspectives. Data from the functional behavior assessment are then organized and entered into the *function matrix* to assist teams in analyzing data to determine the hypothesized function(s) of target behavior. A hypothesis statement of the function of the target behavior was then written.

Finally, teams selected and operationalized a replacement behavior, which often focused on functionally equivalent and more socially acceptable behaviors resulting in the student's needs being met.

Step 2 included 13 checklist items, seven handouts and two additional materials. The handouts included: (a) *universal checklist* (Special School District of St. Louis County, 2014), (b) School Archival Records Search (SARS) and SARS profile form (Walker, Block-Pedego, Todis, & Severson, 1998), (c) teacher and parent interview forms using the *preliminary functional assessment survey* (Dunlap et al., 1993), (d) *planning for target behavior* (Lane & Oakes, 2014), (e) *student interview* (Kern, Dunlap, Clarke, & Childs, 1994), (f) *A-B-C data collection form* (Lane & Oakes, 2014), and (g) *functional assessment and behavior intervention plan: planning form* (Lane, Menzies, Bruhn, & Crnobori, 2011). Additional materials included rating scales, which for this study were the *Social Skills Improvement System – Rating Scale teacher and parent versions* (Gresham & Elliott, 2008).

Step 3: Collecting baseline data. In the third step, teams were taught how to determine the dimension of behavior (e.g., rate, duration) to monitor student outcomes. They were taught how to select a behavior recording system aligned to the behavior of interest (e.g., target and/or replacement behavior). This was often the replacement behavior in an effort to monitor and report desired behavior changes focusing on the more positive behavior (e.g., increased academic engagement instead of decreased off-task behavior). Data recording procedures are then planned, taught, and practiced by two or more team-members to criterion (e.g., 90% interobserver agreement [IOA] across three consecutive trials) to ensure confidence in the data collection and maintain clarity of the behavior being measured. Once two recorders were reliable in an authentic classroom setting, baseline data collection occurred, which included approximately five observations (min of three observations) by a primary observer. The secondary observer independently observes and collected data at the same time as the primary observer for a min of 25% of observations, which was used to calculate IOA. Teams were taught during training and during additional coaching opportunities outside of training to graph and monitor baseline data.

Graphs were used to inform phase change decisions, such as when to introduce the intervention. Step 3 included 12 checklist items. The handouts included: (a) *functional assessment and behavior intervention plan: planning form* (Lane, Menzies, et al., 2011) (b) data collection sheets, and (c) other materials associated with data collection and graphing (e.g., spreadsheet).

Step 4: Designing the intervention. In the fourth step, teams were taught and began the design process using the *function-based intervention decision model* (as described in the introduction). Once the intervention method was selected, teams designed specific plan tactics using A-R-E components. Once an intervention plan was designed, the teacher and student were trained in the procedures and implementation materials were prepared. Finally, social validity surveys (e.g., Intervention Rating Profile-15 [IRP-15] and Children's Intervention Rating Profile [CIRP]; Witt & Elliott, 1985) were used to make sure the teacher, parents, and student had (a) consensus on the goals, (b) were comfortable with the procedures, and (c) believed the intervention likely to achieve desired outcomes. Teams were taught to examine pre-intervention social validity to determine if any serious concerns were present for any of the stakeholders (e.g., student feeling embarrassed, teacher not feeling intervention components were feasible, parent concerns regarding loss of instructional time). If social validity was low, teams were taught to consider whether (a) additional training on the plan and/or (b) plan’s procedures needed to be revisited and modified to alleviate stakeholder concerns. Teams may have continued baseline data collection during step 4. Step 4 included 10 checklist items, with the following handouts and materials: (a) *functional assessment and behavior intervention plan: planning form* (Lane, Menzies, et al., 2011); (b) *treatment integrity checklist* adapted from Lane, Oakes, et al., (2011); (c) social validity measures (e.g., Witt & Elliott, 1985); (e) data collection sheets; and (e) other materials associated with data collection and graphing.

Step 5: Testing the intervention. In the fifth step, teams were taught to implement and evaluate the intervention, using three essential indicators of trustworthiness to draw accurate conclusions regarding intervention outcomes. Teams were taught to answer three questions in evaluating the effects of FABI: (1) Was the intervention implemented as planned (i.e., treatment integrity)? (2) Was a functional relation established between the introduction of the intervention and changes in student behavior and did these outcomes generalize or maintain (i.e., monitoring student outcomes to determine a functional relation)? and (3) What did stakeholders (e.g., teachers, parents, student) think about the social significance of the intervention goals, the social acceptability of the intervention procedures, and (anticipated) effects of the intervention prior to/concluding the intervention. For this, teams implement procedures to (a) monitor treatment integrity, (b) implement a single-case research design (e.g., A-B-A-B withdrawal, changing criterion, multiple baseline) to monitor student outcomes, and (c) administer social validity surveys prior to and at the conclusion of the intervention. Step 5 included 19 checklist items with the following handouts and materials: (a) *functional assessment and behavior intervention plan: planning form* (Lane, Menzies, et al., 2011); (b) *behavior intervention plan* (Lane, Menzies, et al., 2011); (c) *ethics checklist* (Ferro, Umbreit, & Liaupsin, 2010); (d) social validity measures (e.g., Witt & Elliott, 1985); and (e) materials associated with data collection and graphing.

Procedural Integrity

To examine the extent to which training processes happened within training sessions and between training sessions, two procedural integrity measures were developed. First, the *series procedural fidelity observation tool* (see Appendix 11) was developed to monitor university and state trainers, district coaches, and team members' implementation and/or participation in training related activities within sessions. Second, coaching protocols were developed to document dosage (e.g., coaching contacts, coaching format) between sessions to track how district coaches supported teams between sessions. Each measure is described subsequently.

Training process. The FABI professional learning series *procedural fidelity observation tool* is an 18-item procedural integrity checklist to monitor presenters, district coaches, and team members' implementation and participation in the professional learning series. Ratings were completed using a 3-point Likert-type scale ranging from 0 to 2. For items specific to presenters and district coaches the scale was 0 = *not implemented*, 1 = *partially implemented*, and 2 = *fully implemented*. For items specific to FABI team members the scale consisted of 0 = *no*, 1 =

partially, and 2 = *fully*. Percent of points awarded were calculated by summing points awarded divided by total points possible based on items scored and multiplied by 100. Percentages were calculated for presenters, district coaches, team members, and overall training experience. Total scores possible ranged from 0-22, 0-16, and 0-22 respectively. The primary observer monitored procedural integrity for each training day (*n* = 15) and a second observer simultaneously monitored 53.33% (*n* = 8) of the scheduled training days throughout the professional learning series. Interobserver agreement (IOA) averaged 81.85 (*SD* = 11.85; range: 64.00-96.30). Following first training day, primary observer met again with PI and clarified items across p*rocedural fidelity observation tool*, following this review IOA ranged 88.00-96.30 across remaining sessions.

Coaching process. Four coaching protocols were developed to support coaches between each session. After session one coaching protocol focused on Steps 1-2, after session two focused on Step 3, and after session four focused on Step 5. Coaching protocols paralleled the items associated with each step checklist, with the addition of space to monitor: (a) date each item was completed, (b) the stage in the process the team was at for each item prior to coaching (i.e., Likert type scale: 0 = *not completed*, 1 = *partially completed*, 2 = *fully completed*), and (c) coaching notes (e.g., What direction did I provide? What feedback did I provide?). Additionally, coaches were asked to document the number of meetings between sessions (e.g., date, start and end time), and whether each contact occurred in person, by video conference, or by audio/telephone conference. Coaching dosage was calculated by counting the frequency of coaching contacts between each session and its format (e.g., in person, remote).

Attendance. District coaches and trainees attendance data were collected to monitor access or exposure to the professional learning series within and across days. Attendance was collected in the AM and PM for each training day. Attendance was scored using the following codes: 0 (*absent in AM and PM*), 1 (*present in either the AM or PM o*nly) and 2 (*present in both AM and PM*). Total attendance was summed, with possible scores ranging from 0-10.

Descriptive measures

Demographic. Team members, state trainers, and district coaches completed a brief demographic form prior to training (state trainers) or on the first day of attendance of the professional learning series (team members, district coaches). This measure included items related to participants' demographic information along the following variables: (a) gender, (b) age, (c) race/ethnicity, (d) experience in years, (e) role, (f) certification status, (g) highest level of education, (h) course work experience classroom management and functional behavior assessment, and (i) professional development experience in academic screening and behavior screening. For item level detail and how demographic variables were used in analyses see Appendices 12-13. Student demographic information was gathered during *Step 2: Conducting the functional assessment* and shared by team members who submited information pertaining to *Step 2*.

Professional Learning Series Outcomes

For a summary of professional learning series outcome measures and how each measure is related to the subsequently described data analytic plan see Appendix 13. To view professional learning series outcome measures see Appendices 14-15.

FABI formative assessment. *Formative assessments* were developed to assess attendee knowledge at the start and end of each training session. For each of the five training sessions, ten multiple choice questions were developed based on the learning objectives and training materials associated with each training day. Each question had four possible answers, with one correct answer. See Appendix 14 for formative assessment answer key. Each question was worth one point, for a total of ten points. The same questions were used at the opening and close of each training session. Daily pre and post scores were calculated by summing total possible correct (range: 0-10). Finally difference score were calculated by subtracting pre session from post session (post score - pre score; range 0-10). Both difference scores and post scores were used across analyses to examine growth (difference scores) and final post scores. *Formative* *assessments* were developed as a criterion-related measure. Content validity was assessed by both PIs, as well as two content-expert practitioners comparing session materials to each session's formative assessment to confirm alignment.

Knowledge, confidence, and use (KCU) FABI Survey. *KCU surveys* have been applied in various professional development studies to examine shifts in knowledge, confidence, and usefulness of concepts and skills. The design of the measure was adapted from a Project SKIL survey developed by Borthwick-Duffy et al. (2002) and adopted by Barton-Arwood and colleagues (2005) to assess gains in educators' knowledge, confidence, and use of applied behavior analysis concepts and strategies following a workshop around teaching social skills and appropriate replacement behaviors. The measure was found to be reliable (α = .85-.87) across the three constructs (Barton-Arwood et al., 2005). More recently, Lane et al. (2015) found the *KCU survey* to be a reliable measure of participants' KCU after a four to five-day professional development series with applied practice on FABI (α = .94-.95).

For the current study, the FABI KCU measure was developed to assess participants' knowledge, confidence, and perceived usefulness of 15 concepts and strategies constituting the process of designing, implementing, and evaluating FABIs taught throughout the professional learning series (see Appendix 15). The following concepts and strategies were assessed: performance deficit, function matrix, functional assessment-based intervention, functional assessment interview, social validity, operational definitions of behavior, positive reinforcement, replacement behavior, acquisition deficit, A-B-C data collection, antecedent adjustments, extinction, generalization and maintenance, momentary time sampling, and treatment integrity. For each item, participants were asked to provide three ratings for each item: (a) how *knowledgeable* they perceive themselves to be about each concept or strategy, (b) how *confident* they were in their ability to use the concept or strategy, and (c) how useful they perceived each concept or strategy (Lane et al., 2015). Ratings were completed using a 4-point Likert-type scale (i.e., 0 = *I have no knowledge of this concept or strategy*, 1= *I have some knowledge of this concept or strategy*, 2 = *I have more than average knowledge of this concept or strategy*, and 3 =

I have a substantial amount of knowledge about this concept or strategy). For purposes of data analysis a total score was created for knowledge, confidence, and use scores by summing the 15 items for each construct. Scores for each construct ranged from 0 to 45, with higher scores indicating greater knowledge, confidence, or perceived utility, respectively. Total scores were used in subsequent analyses. Alpha coefficients for perceived constructs at each time point were as follows: (a) pre: knowledge = 0.95, confidence = 0.95, and use = 0.97; and (b) (a) post: knowledge = 0.94, confidence = 0.93, and use = 0.96; suggesting excellent internal consistency (see Appendix 16).

The FABI *KCU survey* was modified from Lane et al. (2015) to additionally measure participants' actual knowledge by creating a new criterion-referenced subscale consisting of 15 multiple choice questions aligned to the 15 KCU ratings previously described. Similar content validity methods as used in the development of the *formative* assessment were employed for the actual knowledge subscale. For each question, there was one correct answer (*3 points*) and three distractor answers written and scored to allow participants who demonstrated partial knowledge to receive partial credit. Distractors were written as follows: partially accurate answer with no inaccurate information (*2 points*); partial accurate answer with some inaccurate information (*1 point*); and incorrect answer with no accurate information (*0 points*). For purposes of data analysis an actual knowledge score was created by summing the points for each item, resulting a potential score of 0 to 45. Percentage scores were also computed for pre and post-actual-knowledge scores by dividing the total points indicated, by the total points possible and multiplying by 100 to obtain a percentage score (range: 0 to 100%). Both difference scores and post scores were used across analyses to examine growth (difference scores) and final post scores. Criterion-related validity comparing concurrent relation of perceived knowledge subscale (as percent; range 0-100) to actual knowledge subscale across two scoring methods were as follows: correct/incorrect (range 0-1; pre: $r = 0.30$; post: $r = 0.12$) and partial accuracy (range: 0-3; pre: $r = 0.34$; post: $r = 0.16$; see Appendix 17).

FABI: Step completion and quality. Checklists were used across each step to document completion: Step one (3 items), Step 2 (13 items), Step 3 (12-items), Step 4 (10-items; 1 item removed from analysis [e.g., prepare intervention materials]), and Step 5 (19 items). Each item was scored on a 4-point Likert-type scale: 0 = *Item not completed*, 1 = *Item partially completed, less than half*, 2 = *Item partially completed, at least half or greater*, and 3 = *Item completed*. Similarly, each item across step checklists was also scored for quality and knowledge in completing each step accurately. Each item was scored on a 4-point Likert-type scale: 0 = *No knowledge/accuracy*, 1 = *Partially accurate knowledge, but inaccurate information included*, 2 = *Partially accurate knowledge, with no inaccurate information included*, and 3 = *All provided information correct*. Percent completion and percent quality were calculated by summing the total points earned using the Likert-type scale and dividing with the total points possible for each step and multiplying the quantity by 100 to obtain a percentage (range: 0 -100%). In addition to producing percent completion and percent quality for each step (i.e., Step 1, Step 2, Step 3, and Step 5; ranges 0-100%) total step completion and quality was calculated across all steps (57 items; range 0-100%). Interrater agreement for step completion and step quality is described subsequently.

***FABI: Student functional relation*.** Student outcome data were evaluated using the final graphs teams submitted with their step 5 materials. Each team implemented a single-case research design (e.g., A-B-A-B) to monitor the introduction of the independent variable (i.e., BIP) and changes in student outcomes (e.g., target or replacement behavior). Student graphs were evaluated for a functional relation by examining level, trend, and stability within and across phases. A functional relation was either *present* (1) or *absent* (0). Interrater agreement for determining student functional relation is described subsequently.

FABI: Step completion and quality interrater agreement. Three coders were trained to reliability in scoring step completion, step quality, and determining a functional relation. All coders had previous graduate level course work in FABI using the Umbreit model (2007). Step checklists were reviewed and examples ad non examples of each item using the Likert-type scale were discussed. Reliability of training was assessed across three consecutive trials with interrater agreement (IRA) at 90% or higher. IRA scores for reliability of training were as follows (a) coder 1 and 2 : 89.35, 94.73, 96.05, and 96.05%; (b) coder 1 and 3: 95.39, 98.68, and 96.71. The primary coder (coder 1) scored all 67 teams FABI materials for step completion, step quality and determining a functional relation, secondary coders (coder 2 or 3) scored 19 teams' FABI materials (28.36%) with an average IRA of 97.04% (*SD*: 2.83; range: 90-100%) across step completion, step quality, and determining a functional relation. A consensus model was used when two models disagreed where coders discussed coding, reached consensus and confirmed with PI.

Design and Analyses

Descriptive and experimental designs were used to address the research objectives. First, data were screened by examining descriptive statistics. Specifically, we computed (a) missingness at individual item level and composite/percentage scores following pairwise deletion; (b) mean, standard deviation, and range; and (c) skewness and kurtosis. Cronbach coefficient alphas, biserial correlations, and Pearson correlations were computed for *KCU* survey, appropriate to each metric of measurement. Multiple imputations (described subsequently) were employed across composite and percentage subscales for *KCU survey* and formative assessment to respond to missing data examining trainee outcomes related to their learning and student outcomes related to demonstrating a functional relation. Pairwise deletion (described subsequently) was employed across step completion and step quality. Data analytic plans across the three research objectives are described sequentially subsequently. All statistical procedures were conducted in Statistical Analysis System software (SAS; SAS Institute, 2013) or R (R Core Team, 2017). Descriptive statistics, Cronbach's alpha, multivariate analysis of variance (MANOVAs), and analysis of variances (ANOVAs) were calculated in SAS. Effect sizes were calculated in Microsoft Excel.

Missing data. Based on consent procedures (e.g., any materials submitted could be used for research purposes, missing data not at random was expected) missing data was expected and with some degree of missing not at randomness. The most common way for handling missing data (upwards of 10%) has historically utilized list-wise deletion, which is ideal for data missing completely at random (Snijders & Bosker, 2012). In list-wise deletion, a case is dropped from an analysis if it has a missing value in at least one of the specified variables; however, this approach can result in both biased parameters and standard errors (Enders, 2001). Modern data analysis techniques, (e.g., multiple imputations) allow data to be filled in with imputed values using specified regression models, which allows for more accurate variability with multiple imputations for each missing value (Pornprasertmanit, 2013; Stef van Buuren et al., 2017). For *KCU* surveys, missing data of item-level pre and post variables averaged 7% (*SD* = 6) and 15 (*SD* = 0) respectively. Following list-wise deletion of composite scores, missingness averaged 19% (*SD* = 8) and 19 (*SD* = 1) at pre and post. For *formative assessment*, missing data of item-level pre and post variables averaged 22% (*SD* = 8) and 20 (*SD* = 7) respectively. Following list-wise deletion of composite scores, missingness average from 44% (*SD* = 16) and 35 (*SD* = 16) at pre and post. For step completion and step quality, missing data of item-level averaged 4% (*SD* = 3) and 31 (*SD* = 27) for step completion and step quality respectively. Following list-wise deletion of composite scores, missingness averaged 38% (*SD* = 44; Range: 3-94%) for step completion and 33 (*SD* = 36; Range: 6-82) for step completion.

Resulting from having more item-level outcome variables than sample size, multiple imputations using R (R Core Team, 2017) and the *mice* package (Stef van Buuren et al., 2017) was used to impute composite scores at pre and post across KCU and formative assessment constructs. If any item was missing, then composite score was marked as missing and was imputed. Two-level normal imputation methods were fixed to estimate predictors of missingness for demographic and *KCU survey* and *formative assessment* composite scores. Whether teams demonstrated a functional relation was amputated at level-2 (random effects) by Bayesian linear regression (Stef van Buuren et al., 2017). Difference scores and percentage scores were calculated from pooled imputed data sets. 100 imputations with five iterations were employed to complete 100 sets of multiply imputed data, convergence was investigated by plotting each *formative assessment* and *composite score* to show the mean and standard deviation of each variable across imputations. Convergence was deemed acceptable as lines freely intermingled without showing any definite trends (Pornprasertmanit, 2013).

Although the MICE package can handle large amounts of missing data and produce less-biased estimates, there is no consensus on how much missingness is too much missingness (e.g., 60-80%; Lee & Huber, 2011). Variables with a high degree of missing data points are expected to end up with larger error terms than those with fewer missing data points, so the ability to detect significant relations to those variables would be limited accordingly. As such, pairwise deletion and not multiply imputed procedures were employed for step completion and step quality.

Analyses for research objective one. To examine trainers' procedural fidelity with which trainers across the three cohorts conducted each of the five sessions, as well as to the extent trainees and coaches participated and engaged within the sessions, percentages were calculated by summing points awarded for each training day and dividing by total points possible based on items scored and multiplying by 100. Averages and standard deviations of trainers', trainees, and coaches fidelity across the five training days were calculated by cohort and overall total across cohorts. Differences between cohorts were examined descriptively by examine magnitude difference between university led trainings (Cohort A) to state trainer led trainings (Cohort B and C) and differences between the two state trainer led trainings using the following formula:

$$d = \frac{M_A - M_B}{SD\ \text{pooled}} \tag{1}$$

Trainees and coaches' attendance were computed for each day and summed for total attendance. Total attendance is described descriptively (*M*, *SD*) across cohorts and one-way ANOVAs were examined to compare differences between cohorts. Finally, descriptive statistics describing total number of teams met by coaches between training days (count; frequency), and average and standard deviation of how many meetings occurred across teams are reported by cohort.

Analyses for research objective two. To evaluate team progress and trainees' learning outcomes, including a description of the students with whom they supported, descriptive statistics were computed across *formative assessment*, *KCU* survey, as well as across items representing each step of the systematic five-step process (i.e., step checklist for quality and completion). To examine learning within sessions, *formative assessment* pre and post test scores for each training day were averaged and compared across cohorts using pooled sets of multiply imputed data. Growth was examined by monitoring magnitude effects (Cohen's *d*; formula 1) within each cohort and across the five training days. Growth (difference score) and where trainees ended up (post test score with pre test score as covariate) were regressed on cohort, role, years' experience, degree and age to examine differences in mean difference score across cohort and demographic variables. To examine FABI teams' progression through the five steps, step completion and step quality were examined using descriptive statistics and represented graphically following pairwise deletion. Differences between cohorts regarding step completion and step quality using regression were planned, but due to too much missingness are described descriptively (e.g., *M*, *SD)* for percentage step completion and percentage step quality by step for each of the three cohorts and overall (across cohorts; total). Finally, to examine teams' learning from start to finish, *KCU survey* pre and post training scores were averaged and compared across cohorts using pooled sets of multiply imputed data. Growth was examined by monitoring magnitude effects (Cohen's *d*; formula 1) within each cohort. Growth (difference score) and where trainees ended up (post training score with pre training score as covariate) were regressed on cohort, role, years' experience, degree and age to examine differences in mean difference score across cohort and demographic variables.

Analyses for research objective three. To evaluate the extent to which FABI teams' design, implementation, and evaluation of FABI in supporting a student as part of the PBPL's applied activities pooled sets of multiply imputed data were used to examine differences across cohorts. Specifically, demonstrating a functional relation was regressed on cohort, role, years' experience, degree and age to examine differences in mean difference score across cohort and demographic variables.

Results

Procedural Integrity of FABI Professional Learning Series

Overall, the professional learning series was implemented with moderate to high levels of fidelity across cohorts led by either university or state trainers (*M* = 87.89%; *SD* = 5.81). Average procedural fidelity across the five training days led by university trainers in Cohort A averaged 89.44% (*SD* = 6.03), average procedural fidelity across trainings led by state trainers averaged 88.11 (*SD* = 6.30) and 86.11 (*SD* =5.91) for Cohorts B and C respectively (See Table 5). Magnitude differences comparing training series between cohorts led by either university or state trainers were small-to-moderate (*d* = 0.24 and 0.62), suggesting higher levels of procedural fidelity implemented by university trainers.

Similarly, moderate-to-high levels were observed in examining coaches' participation and engagement across the three cohorts. Engagement and participation for coaches across the training series averaged 86.94% (*SD* = 14.75). Coaches' participation and engagement across the five training days led university trainers in Cohort A averaged 82.38% (*SD* = 23.32), procedural fidelity across trainings led by state trainers averaged 89.29 (*SD* = 11.85) and 89.15 (*SD* = 6.19) for Cohorts B and C respectively (see Table 5). Moderate differences were observed when comparing cohorts led by university trainer versus cohorts trained by state trainer (*d* = -0.42 and -0.44), suggesting coaches were more engaged during trainings led by state trainer. Nominal differences were observed between coaches engagement between the two cohorts led by state trainers (*d* = 0.02).

High levels of trainees' participation and engagement were observed across the three cohorts. Engagement and participation for coaches overall across the training series averaged 90.48% (*SD* = 8.14). Trainees' participation and engagement across the five training days led university trainers in Cohort A averaged 95.18% (*SD* = 4.78), procedural fidelity across trainings led by state trainers averaged 91.18 (*SD* = 7.40) and 85.09 (*SD* = 9.48) for Cohorts B and C respectively (see Table 5). Moderate-to-large differences were observed when comparing cohorts led by university trainer versus cohorts trained by state trainer (*d* = 0.72 and 1.68), suggesting trainees were more engaged during university led trainings. Nominal differences were observed between trainees engagement across the two cohorts led by state trainers (d = 0.80).

District coaches attended the majority or all of sessions partially (attended AM or PM only) or fully (attended AM and PM). A one-way ANOVA was conducted to determine if district coaches' attendance was different across cohorts. There were no outliers, as assessed by boxplot and data were normally distributed for each group, as assessed by Shapiro-Wilk test (p <0.001). Total attendance averaged 7.13 (SD = 3.44), 8.63 (SD = 2.07), and 8.17 (SD = 1.94) for district coaches across Cohort's A, B, and C respectively. Differences in district coaches attendance between cohorts were not statistically significant, $F(2, 19) = 0.68$, $p = 0.52$.

Trainees also attended the majority or all of sessions partially or fully. A one-way ANOVA was conducted to determine if trainee's attendance was different across cohorts. There were no outliers, as assessed by boxplot and data were normally distributed for each group, as assessed by Shapiro-Wilk test (p <0.001). District coaches total attendance averaged 8.86 (SD = 1.75) for Cohort A, 8.54 (SD = 1.76) for Cohort B, and 8.50 (SD = 1.91) for Cohort C. Differences in trainees attendance across cohorts were statistically insignificant, $F(2, 333) = 1.02$, $p = 0.36$.

In monitoring dosage of coaches' meetings with teams between training days, coaches met on average 1.76 FABI teams (SD = 1.26; Cohort A), 1.50 (SD = 1.00; Cohort B), and 4.75 (SD = 2.06; Cohort C; see Table 6) between training days. A one-way MANOVA with one between –subject factor (Cohort) was performed to examine differences in number of meetings between coaches and FABI teams between sessions (after Day 1, after day 2, after day 3, after day 4). There were no outliers, as assessed by boxplot and data were normally distributed for each group, as assessed by Shapiro-Wilk test for number of coaches' meetings with teams after day 1 (p <0.001), after day 2 (p <0.001), after day 3 (p <0.001), and after day 4 (p <0.001). Results from the one-way MANOVA revealed a significant multivariate effect by cohort (Wilks' $\Lambda = 0.32$; p = 0.03) suggesting a significant difference between cohorts across at least one of the days for number of coaches' meetings with FABI teams. Follow-up univariate ANOVAs showed that number of coaches' meeting after Day 1 ($F(2, 50) = 7.35$, $p < .001$) were statistically significant between cohorts, using a Bonferroni adjusted level of 0.01. Significant differences were not observed in number of coaching meetings after training Day 2, Day 3, or Day 4. Teams from Cohort A met on average 5.93 (*SD* = 5.48) times with their coaches following Day 1, teams from Cohort B met on average 2.39 (*SD* = 1.47) times, and teams from Cohort C met on average 2.19 (*SD* = 1.22; see Table 6). Tukey post-hoc tests showed that teams from Cohort A had higher means number of coaches' meetings following Day 1 than teams from either Teams in Cohort B or C ($p < .05$), but teams from Cohort's B and C did not have significant differences.

FABI Team Progress and Trainee Learning Outcomes

Trainee learning outcomes within sessions (*formative assessment*). Overall, trainees demonstrated small to large gains in knowledge related to FABI content taught within each of the five days (see Appendix 14). Cohort A, led by university trainer demonstrated small-to-large magnitude gains (d = 0.19 - 0.94) between pre-session and post-session formative assessment scores. Cohort B, led by state trainers demonstrated small to medium magnitude gains (d range: 0.02 - 0.64) as did Cohort C (d range: 0.24 - 0.54; see Table 7). Regressions on growth (difference scores) and post scores were performed on *formative assessment* using pooled sets of multiply imputed data to test for differences across cohorts, as well as other demographic variables. Across models, differences in growth and post scores were not significantly different across cohorts, with the exception of Day 2's post score. Trainees from Cohort A's post scores averaged on average 7.98 (1.57) on Day 2, trainees from Cohort B scored on average 7.39 (*SD* = 2.67), and trainees from Cohort c scored on average 7.79 (*SD* = 2.71). After controlling for pre test on post test, average post B post scores were smaller than Cohort A's post scores, which were significant ($\beta = -0.55$, $p = 0.02$). Further, the role of special educator was also significant predictor in the regression model on growth (difference score) for Day 5 ($\beta = -1.85$, $p = 0.02$). On average, special educators scored on average -1.85 different points below general educators from Cohort A (reference group; intercept). Other demographic variables were not identified as significant predictor across any of the other growth (difference) or post score (after controlling for pre) regression models. For a summary of *beta* coefficients, and significance levels across regression models see Table 8.

Team progression sessions (*step completion, step quality*). Due to high levels of missing data at level 2 (n = 62 teams; see Appendices 20-25), multiple imputations were not computed. Instead descriptive statistics (M, SD; see Figure 1) and visual representation (bar graphs of step Completion and step quality across teams; see Appendix 25) of step completion were used to describe differences across cohorts following pairwise deletion. Visually inspecting the data, the majority of teams across cohorts completed Step 1 (61 teams complete 80% or more; see Appendix 25, Panel A) and Step 2 with varying degrees of quality in Step 2 (52 teams compete 80% or more; see Appendix 25, Panel B). Declines in terms of step completion and step quality are observed across Step 3 (27 teams complete 80% or more), Step 4 (28 teams complete 80% or more), and Step 5 respectively (27 teams complete 80% or more; see Appendix 25 Panels C, D, and E).

Figure 1 summarizes descriptive statistics for percentage of teams starting, completing, and quality of teams' progression across the five steps. Team's average step completion across the five steps were as follows: Step 1 (M = 97.26; SD = 7.86), Step 2 (M =87.18; SD = 8.68), Step 3 (M = 66.88; SD = 27.52), Step 4 (M = 73.61; SD = 25.50), and Step 5 (M = 63.58; SD = 32.72). Similar patterns were seen across cohorts for step quality: Step 1 (M = 98.57; SD = 3.76), Step 2 (M = 72.93; SD = 5.90), Step 3 (M = 73.38; SD =14.43), Step 4 (M =85.80; SD = 11.34), and Step 5 (M =79.17; SD = 11.45). Step completion and step quality is reported in Figure 1, nominal differences are descriptively observed across cohorts with the exception of Step 3., with differences in both average and variability observed across cohorts: Cohort A (M = 73.89; SD = 32.59), Cohort B, (M = 58.55; SD = 25.58), and Cohort C (M = 71.74; SD = 24.67).

Trainee learning outcomes from start to finish (*KCU survey*). Overall, trainees demonstrated the smallest pre test scores on perceived knowledge and confidence; these constructs also showed average scores across cohorts increasingly two-fold from pre to post test scores (see Table 9 and Appendix 19). Conversely, trainees demonstrated the largest average scores at pretest on both perceived usefulness and actual knowledge. Effect sizes between pre and post were consistently large across cohorts for both perceived knowledge (*d* = 1.70, 1.01, and 1.09 for Cohorts A, B, and C; see Table 9) and perceived confidence (*d* = 1.76, 0.91, and 1.). Large effect sizes were observed for perceived usefulness for Cohort A (led by university trainer; *d* = 1.01) with smaller to moderate effect sizes observed in cohorts led by state trainers (*d* = 0.45, 0.32 for Cohorts B and C). Similar patterns were also observed for the construct actual knowledge, with Cohort A demonstrating a larger magnitude effect (*d* = 0.97) in comparison to the two cohorts led by state trainers (*d* = 0.38, 0.66 for Cohorts B and C). To examine the statistical significance of difference across cohorts a series of regressions on growth (difference scores) and post scores were performed across each *KCU survey* construct using pooled sets of multiply imputed data to test for differences across cohorts, as well as other demographic variables. For a summary of *beta* coefficients, and significance levels across regression models see Table 10.

Perceived knowledge. The results of the regression on perceived knowledge growth indicated six predictors explained 24.87% (R^2's 95% CI [0.16, 0.34]) of the variation on perceived knowledge growth, a small effect size according to Cohen (1988). Difference across cohorts were not significant, although trainee's role significantly predicted growth on perceived knowledge, particularly the role of special educator (β = -5.74, p = 0.01), administrator (β = -5.37, p = 0.02), and related service provider (β = -6.39, p <= 0.01) whose growth scores were significantly lower than general educator teachers (reference intercept). This may be due to a ceiling effect, which is evident in that these roles showed larger pre test scores, which ultimately left less room for their growth. Significant differences in post-training score were not observed for perceived knowledge.

Perceived confidence. Results of the regression on perceived confidence growth indicated six predictors explained 18.58% (R^2's 95% CI [0.10, 0.28]) of the variation on growth, a small effect size according to Cohen (1988). Differences in growth on perceived confidence were observed between Cohort A and B (β = -3.96, p = 0.01). This suggests on average, Cohort

B's difference score was -3.96 units lower than Cohort A. Additionally, similar patterns were observed by trainers' role: special educator (β = -5.32, p = 0.03), administrator (β = -5.72, p = 0.02), and related service provider (β = -5.64, p = 0.01). Again, differences in post-training scores were not observed for perceived confidence.

Perceived usefulness. Results of the regression on perceived usefulness growth indicated six predictors explained 10.07% (R^2's 95% CI [0.04, 0.18]), a small effect size according to Cohen (1988). Differences in growth on perceived usefulness were observed between Cohort A and B (β = -5.29, p = 0.04) and Cohort A and C (β = -8.54, p < 0.01). Across cohorts, teams from university led (Cohort A) trainings demonstrated higher average growth scores in comparison to either cohort led by state trainers (Cohorts B and C). Demographic variables did not significantly predict growth on perceived usefulness. The results of the regression on post score with pre test as a covariate indicated seven predictors explained 13.87% (R^2's 95% CI [0.07, 0.23]), a small effect size according to Cohen (1988). Differences in post-training perceived usefulness were observed between Cohort A and B (β = -3.83, p < 0.01) and Cohort A and C (β = -4.68, p < 0.01), as did trainee's role of special educator (β = 4.23, p = 0.04). This suggests trainees from university led trainings ended with high post scores after controlling for pre test in comparison to either cohort led by state trainers (Cohorts B and C). An opposite pattern was noted in role, with special educators scoring on average 4.23 units higher on perceived usefulness at post test.

Actual knowledge (0-3 scale). The results of the regression on actual knowledge growth indicated six predictors explained 10.25% (R^2's 95% CI [0.04, 0.18]) of the variation on actual knowledge growth, a small effect size according to Cohen (1988). Differences in growth on actual knowledge were observed between Cohort A and B (β = -2.16, p = 0.01). This suggests trainees in Cohort B scores changed on average 2.16 units below Cohort A's growth scores. Education level was also predicative with differences in growth on actual knowledge, with trainees with either a (a) master's degree plus thirty college units (β = -3.67, p = 0.01) or (b) doctoral degree (β = -4.73, p = 0.01) demonstrating smaller growth scores. The results of the regression on post training score with pre training score as a covariate indicated seven predictors explained 27.22% (R^2's 95% CI [0.18, 0.37]) of the variance of post scores, a small effect size according to Cohen (1988). Differences in post-training actual knowledge were observed between both Cohort A and B (β = -1.99, p = 0.01) and trainees who were related service providers (β = 2.31, p = 0.02). This suggests trainees in Cohort A demonstrated higher post scores in comparison to trainees in Cohort B. Conversely, related service providers showed on average higher post training scores than general education teachers.

Student Outcomes Associated FABI Professional Learning Series

Across the 67 teams, 44 teams submitted materials (i.e., graph) to allow visual inspection of student-level data to determine whether a functional relation was established (34% missing data). Of which, nine teams (20.45%) demonstrated a functional relation between the introduction of the BIP and changes in student performance. Thirty-five teams (79.55) did not demonstrate a functional relation due to design constraints (e.g., implementing A, A-B, A-B-A, only) or for not demonstrating a functional relation as determined by three successful demonstrations of phase changes (e.g., inadequate demonstration of changes in level, trend stability within and/or across conditions). Using pooled sets of multiply imputed data, in an underpowered regression model, cohort and demographic variables indicated six predictors explained 6.17% (R^2's 95% CI [0.02, 0.13]) of the variation in demonstrating a functional relation. It was found that neither cohort assignment, nor any other predictors included in the model significantly predicted whether teams demonstrated a functional relation between the introduction of the independent variable and changes in student performance. For a summary of R^2, beta coefficients, and significance levels across this regression model see Table 11.

Discussion

We sought to replicate and extend findings on practice-based professional learning (PBPL) aimed to support practitioner-led team-based FABI utilizing the Umbreit model (Lane et al., 2015; Oakes et al., 2017). Specifically, this study examined (a) perceptions of school-site FABI team members (trainees) participating in a practice-based professional learning series, (b) how thoroughly and how well teams completed a systematic five-step process, and (c) the extent to which teams were able to demonstrate a functional relation between introducing a behavior intervention plan linked to the functional behavior assessment results and student behavior change. We extended the work of Lane et al. (2015) and Oakes et al. (2017) by examining differences across three cohorts—one led by professional learning series developers and two led by state technical assistance providers—to evaluate the extent to which PBPL could be implemented and lead to similar outcomes at the trainee and student level.

Procedural fidelity increasingly has become an important aspect of assessing the consistency of intervention and program delivery (DiGennaro Reed & Codding, 2014). As hypothesized, results of this study showed moderate-to-high levels of procedural fidelity across sessions and cohorts led by university versus state-technical assistance providers with small to moderate magnitude differences between trainers. Further, no differences were identified when comparing (a) trainees and district coaches' attendance, (b) trainees' engagement within sessions, nor (c) coaching dosage between sessions. Results offer initial evidence supporting this PBPL series can be implemented with comparable procedural integrity across university and state trainers. These findings are consistent with findings from previous studies examining professional learnings on similar topics by either state technical assistance personnel (Browning-Wright et al., 2007) or university personnel (e.g., Lane et al., 2015). It is the first study to examine professional learning on the Umbreit model taught by state trainers.

As expected, results showed trainees across cohorts made gains in their actual and perceived knowledge, perceived confidence, and perceived usefulness across FABI concepts and strategies. Also, statistically insignificant differences were observed across cohorts led by university or state trainers when comparing perceived knowledge of FABI concepts (in terms of growth or post score), nor the majority of daily formative assessments. Interestingly, a discrepancy was observed between what trainees thought they knew (perceived knowledge) and what they actually knew (actual knowledge) at pre training. A small linear relation was observed between the two constructs at pre test, suggesting trainees knew more about functional approaches to assessment and intervention than they thought they knew.

Contrary to hypothesis, differences were observed showing greater growth (change scores) in trainees from the university trainer led cohort and (a) one of two state trainer led cohorts for perceived confidence and actual knowledge, as well as (b) both state trainer led cohorts on the construct perceived usefulness. Statistical differences were also observed showing greater post training scores in trainees from the university led cohort and (a) both state trainer led cohorts for perceived usefulness, as well as (b) one of two state trainer led cohorts actual knowledge. Collectively, these findings suggest some differences in trainees' outcomes when comparing cohorts led by university and state trainers –but these patterns were inconsistently observed across constructs and state-trained cohorts. More broadly, these findings affirm educators can acquire the necessary knowledge, confidence, and utility of FABI needed in site-level personnel in response to increasing calls to design FABI as mandated under IDEA, as well as recommended as part of tiered service delivery as a viable Tier 3 support (IDEA, 2004; PBIS, n.d.; Horner & Sugai, 2015), and possibly even to guide Tier 2 efforts (e.g., function-based Check-in, Check-out; Ennis, Jolivette, Swoszowski, & Johnson, 2012).

Further, nominal differences were observed across the three cohorts in terms of step completion and step quality, although statistical testing of differences between cohorts were not implemented due to too much missingness. While 94% of teams started varying degrees of steps three through five, fewer than 65% of teams completed Step 5. These findings are consistent with previous literature monitoring the extent to which teams progressed through the PBPL series with minimal university support (Oakes et al., 2017).

Educational Implications

This study offers modest evidence for the implementation and scaling up of FABI as a promising practice (Common et al., 2017) and its transportability to more authentic settings led by real-world practitioners. University, state, and district partnerships can be used to support the implementation process and the transportability of EBP with the goal of empowering district systems to sustain practices over time. Following this study, state trainers and the district implemented a second cohort to train additional schools within the district with nominal university support, with district plans to move forward independently after year three suggesting the district valued the social significance of both the training series and the practice.

Collectively, findings suggest this PBPL was efficacious and effective in leading to desired professional learning outcomes as demonstrated in growth and post test scores across cohorts. Further, this study demonstrated its procedures can be effectively implemented with minimal university support, a promising outcome in terms of scaling up FABI processes in schools. Partnerships within and between district-level, state-level, and university supports can be offered to provide professional learning opportunities with graduated levels of intensity to support school-based teams in meetings the multiple needs of all students. Further, this study offers a model for how university and state technical assistance partnerships are feasible and offer the capability of working in tandem to empower districts to develop FABI professional learnings. Building site-level capacity is an important first step towards sustained implementation by empowering school-site personnel to design, implement, and evaluate FABI following recommended team-based approaches (McCahill et al., 2014; Scott, Anderson, & Spaulding, 2008). As the evidence-based practice movement continues to garner attention, it is important to understand how such practices can be brought to scale using professional learning that is aligned to state and federal regulations, as well as with recommendations derived from both the scientific and professional communities (Collins & Zirkel, 2017; McCahill et al., 2014).

This study also examined new approaches to monitor and measure educators' concepts and strategies related to FABI, as well as monitoring and implementing a vast and complex repertoire of complex behaviors using permanent products collected and shared with the research team. While this study is not without limitations, these research questions and modest findings are promising in that ultimately designing, implementing, and evaluating FABI is an observable, measurable, and repeatable behavior that can ultimately be shaped across a range of school site personnel. These findings are consistent with previous literature (e.g., Bessette & Willis, 2007; Chapter 3).

Limitation and Future Directions

First, there are number of concerns related to sample size and missing data (Schafer & Graham, 2002). For example, there were noticeable imbalances between cohorts led by university trainer (*n* = 76), and state trainers (*n* = 137 and 129 respectively). For example, trainees attending the cohort led by university trainer were smaller and size and showed higher levels of engagement. As such, it is unclear if differences between cohorts is due to difference in trainers or cohort size.

Further, missing data across cohorts ranged from 4 and 31% at the item level across constructs. Following pairwise deletion, this increased to 3-82% across subscales. Composite scores and percentages with fewer than 50% pairwise deletion were included in calculating effect sizes and multiple regression models. As such, step completion and step quality were not analyzed following desired statistical analysis plans. On a related note, teams' demonstration of a functional relation was evaluated using a binary (0 = no functional relation; 1 = demonstrate a functional relation [e.g., three demonstrations across A-B-A-B design]). Future evaluations of teams' ability to demonstrate a functional relation are encouraged to code the number of demonstrations met (e.g., 1 demonstration [A-B], 2 demonstrations, [A-B-A-B]). Results across this study should be interpreted with caution.

Second, this study offers initial examination for the criterion-related validity of the adopted *KCU* survey's actual knowledge multiple choice subscale. Previous studies utilized write in responses to measure actual knowledge, which had better reliability (Lane et al., 2015; Oakes et al., 2017). As researchers and practitioners seek to scale up FABI both in terms of what is happening in buildings, and in how we train school personnel (McCahill et al., 2014), alternative means to evaluate professional learnings, including knowledge acquisitions of trainees, are needed. This study explored the utility of an adopted *KCU survey* measuring actual knowledge using multiple choice as part of our scaling up efforts. In addition to content validity we also assess criterion reference validity by comparing the correlation between perceived and actual demonstrating week relation at pre measure and little to no relation at post. Future research is needed to examine—and optimally with larger samples—additional metrics of criterion-related validity in regards to measuring actual knowledge through criterion-reference multiple choice questions. Future research using this measure is encouraged to examine the (a) concurrent relation of actual knowledge multiple choice to other theoretically similar measures, (b) divergent relation to other theoretically distinct measures, and (c) predictive relations to related outcomes (American Educational Research Association, 2014).

Third, data were not collected on FABI team meetings nor coaching sessions conducted between sessions. Following recommendations by Lane et al. (2015), coaching protocols were distributed to coaches to document teams' progression, as well as topics covered during coaching. Overall, coaches documented only number of visits, with minimal to no documentation of content or dosage. Considering that coaching is a beneficial support to trainees during professional learning opportunities (Kratochwill, Volpiansky, Clements, & Ball, 2007), future research should examine the role of coaching within the training series between training days, as well as ongoing coaching efforts working towards building FABI fluency in team members as they continue to support students, as part of regular school practices, through team-based approaches to design, implement, and evaluate FABI. Fourth, in order to examine trainees' growth and where they ended at the end of training, regression models were performed on difference and post. To examine post training scores while controlling for pre training scores, pre training scores were entered into the model as a covariate predictor and violating the assumption of independence. Future research should examine growth and post-measure scores using a variety of different statistical inferences while controlling for pre training measures as a covariate.

Finally, similar to findings of Lane et al. (2015) and Oakes et al. (2017), trainees perceived usefulness experienced the smallest magnitude gains from pre to post training, but the largest mean score across constructs measured at post. These findings suggest educators perceived FABI to be useful—and even socially valid—at the onset of training and having have yet acquired the desired levels of knowledge or confidence perceived as warranted to design, implement, and evaluate FABI with fluency (Pindiprolu, Peterson, & Bergloff, 2007). Future research is needed to examine the acquisition and fluency of FABI interventions as educators transform from novice to expert implementer within and beyond the confines of a single five-day training series.

Summary

Despite these limitations, we offer this study as evidence to indicate PBPL on functional approaches to assessment and intervention employing the Umbreit model to be effective when implemented with minimal university support. In this study, we focused on (a) participants' learning outcomes, (b) completion and quality levels of practice-based learning activities, and (c) student outcomes. While this study provides initial evidence in support of this PBPL to be effective across university and state technical assistance cohorts, future studies are needed particularly in examining FABI teams' levels of completion and quality, as well as student outcomes.

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Table 1.
Participant Characteristics – Team Members.

Variable	Level	Total *n* = 342 *n* (%)
Gender	Male	51 (15.18)
	Female	285 (84.82)
Highest Degree Obtained	Bachelor's Degree	62 (18.40)
	Master's Degree	151 (44.81)
	Master's Degree + 30 credits	95 (28.19)
	Doctoral Degree/ Educational Specialist	29 (8.61)
Role	General Education Teacher	93 (27.35)
	Special Education Teacher	34 (10.00)
	Administrator	74 (21.76)
	Related Service Provider	134 (39.41)
	Other	5 (1.47)
Grade Levels Taught	EC	1 (0.80)
	PK	6 (4.80)
	K	18 (14.40)
	1	18 (14.40)
	2	19 (15.20)
	3	22 (17.60)
	4	26 (20.80)
	5	22 (17.60)
	6	12 (9.60)
	7	17 (13.60)
	8	18 (14.40)
	9	8 (6.40)
	10	8 (6.40)
	11	9 (7.20)
	12	10 (8.0)
Education & Experience	Certification for Current Assignment	125 (99.21)
	BCBA	3 (0.92)
	Years of Experience in Current Position	*M* = 10.73 (*SD* = 8.91; Range: 1-36)
	Years of Experience in field	*M* = 15.44 (*SD* = 9.37; Range: 1-40)
	Coursework in classroom management	235 (71.65)
	Coursework in functional assessment	110 (34.16)
	PD in academic screening	261 (77.91)
	PD in behavior screening	177 (52.84)

Note. Information is representative of participants who completed the items on the demographic measure; not total sample. BCBA = Board Certified Behavior Analyst, K = kindergarten, PK = prekindergarten, and PD = professional development.

Table 2.
State Trainer and District Coach Characteristics.

Variable	Level	State Trainer Total n = 6 n (%)	District Coach Total n = 24 n (%)
Team Members			
Gender	Male	0 (0)	2 (8.33)
	Female	6 (100)	22 (91.67)
Highest Degree Obtained	Bachelor's Degree	0 (0)	3 (12.50)
	Master's Degree	2 (33.33)	7 (29.17)
	Master's Degree + 30 credits	4 (66.67)	11 (45.83)
	Doctoral Degree/Educational Specialist	0 (0)	3 (12.50)
Role	State Technical Assistance Provider	6 (100)	
	General Education Teacher	0 (0)	0 (0)
	Special Education Teacher	0 (0)	0 (0)
	Administrator	0 (0)	8 (33.33)
	Related Service Provider	0 (0)	6 (25.00)
	Other	0 (0)	10 (41.67)
Education & Experience	Certification for Current Assignment	0 (0)	0 (0)
	BCBA	0 (0)	0 (0)
	Years of Experience in Current Position	M = 3 (SD = 0)	M = 9.30 (SD = 7.78; Range: 1-27)
	Years of Experience in field	M = 20.50 (SD = 14.85; Range: 10-31)	M = 18.33 (SD = 6.98; Range: 7-31)
	Coursework in classroom management	5 (83.33)	18 (75.00)
	Coursework in functional assessment	6 (100)	10 (41.67)
	PD in academic screening	5 (83.33)	24 (100)
	PD in behavior screening screener	6 (100)	13 (54.17)

Note. Information is representative of participants who completed the items on the demographic measure. BCBA = Board Certified Behavior Analyst, K = kindergarten, PK = prekindergarten, and PD = professional development.

Table 3.
Participant Characteristics – Student

Variable	Level	Total *n* = 67 *n* (%)
Students receiving FABI		
Gender	Male	53 (81.54)
	Female	12 (18.46)
Grade Level	PK	0 (0)
	K	5 (7.69)
	1	8 (12.31)
	2	9 (13.85)
	3	10 (15.38)
	4	8 (12.31)
	5	7 (10.77)
	6	0 (0)
	7	6 (9.23)
	8	5 (7.69)
	9	1 (1.54)
	10	2 (3.08)
	11	2 (3.08)
	12	2 (3.08)
	Other	0 (0)
Student Status	General Education	38 (59.38)
	Special Education	26 (40.63)
Primary Eligibility Category for Special Education Services	Autism	3 (4.69)
	Emotional disturbance	5 (7.81)
	Intellectual disability	2 (3.13)
	Other health impairment	6 (9.38)
	Specific learning disability	4 (6.25)
	Speech or language impairment	3 (4.69)
	Gifted	2 (3.13)
	Not specified	1 (1.56)

Note. Information is representative of information completed by teams during the FABI process; not total sample. FABI = functional assessment-based intervention, K = Kindergarten, PK = Prekindergarten.

Table 4.
FABI Case Characteristics of student participants

Variable	Level	Total *n* = 67 n (%)
Target Behavior	Defiance	1 (1.56)
(missing data = 3)	Disruption	10 (15.63)
	Inappropriate talking in class	2 (3.13)
	Negative social interactions	3 (4.69)
	Noncompliance	9 (14.06)
	Nonengagement	1 (1.56)
	Off-task	33 (51.56)
	Off-task/Disruptive	1 (1.56)
	Rapid Pressure Vocalization	1 (1.56)
	Tardiness	1 (1.56)
	Temper tantrums	1 (1.56)
	Verbal aggression	1 (1.56)
Number of Hypothesized Functions (missing data = 5)	One	17 (27.42)
	Two	28 (45.16)
	Three	16 (25.81)
	Four	1 (1.61)
Function of Behavior	S^R+ Attention	52 (83.87)
(missing data = 5)	S^R- Attention	1 (1.61)
	S^R+ Tangibles/Activities	1 (1.61)
	S^R- Tangibles/Activities	37 (59.68)
	S^R+ Sensory	18 (29.03)
	S^R- Sensory	0 (0)
Replacement Behavior (missing data = 3)	Academic engagement/on-task	37 (57.81)
	Appropriate voice level	2 (3.13)
	Appropriately requesting for help	3 (4.69)
	Arriving on time	1 (1.56)
	Compliance	11 (17.19)
	Hands to self	1 (1.56)
	List of functions*	1 (1.56)
	Pro-social verbal behavior	2 (3.13)
	Socially acceptable (pro-social) behaviors	4 (6.24)
	Typical babbling	1 (1.56)
	Sensory tool use	1 (1.56)

Variable	Level	Total *n* = 67
Targeted Dimension of Behavior	Frequency	8 (44.44)
(missing data = 49)	Rate	8 (44.44)
	Duration	1 (5.56)
	Latency	0 (0)
	Topography	0 (0)
	Locus	0 (0)
	Force	0 (0)
	Other (e.g., non-behavior dimension)	1 (5.56)
Selected Measurement System	Event Recording	29 (53.70)
(missing data = 13)	Partial Interval Recording	0 (0)
	Whole Interval Recording	0 (0)
	Momentary Time Sampling	25 (46.30)
Dimension and Measurement System Alignment	Did not Align	8 (42.11)
(missing data = 48)	Aligned	11 (57.89)
Intervention Method	Method 1: Teach the Replacement Behavior	2 (3.77)
(missing data = 14)	Method 2: Improve the Environment	27 (50.94)
	Method 3: Adjust the Contingencies	18 (33.96)
	Combination of Method 1 and 2	6 (11.32)
Function and Intervention Alignment	Did not align	8 (15.38)
(missing data = 15)	Aligned	44 (84.62)
Social Validity	Teacher Perspective: Pre	79.49 (11.85):
M(SD): Range	(missing data = 12)	15-90
	Teacher Perspective: Post	77.33 (11.40):
	(missing data = 24)	34-90
	Child Perspective: Pre	36.49 (5.33):
	(missing data = 16)	15-42
	Child Perspective: Post	36.17 (6.12):
	(missing data = 26)	15-42
Established a functional relation	Did not establish functional relation	35 (79.55)
(missing data = 23)	Established functional relation	9 (20.45)

Note. Information is representative of information completed by teams during the FABI process. Social validity parent = Intervention Rating Profile-15 (IRP-15; Witt & Elliott, 1985; range = 15 - 90); social validity student = Children's Intervention Rating Profile (CIRP; Witt & Elliott, 1985; range = 7 - 42) with higher scores suggesting higher social validity. S^R+ refers to positive reinforcement. S^R- negative reinforcement (Cooper, Heron, Heward, 2007). *indicates incorrect label for replacement behavior.

Table 5.
Training Procedural Integrity.

Construct	Cohort	Role: Presenter Fidelity	Role: Coaches Engagement	Role: Trainees Engagement	Total Procedural Integrity	IOA
Within Sessions						
Day 1 % Met	A	80.00	41.67	90.91	70.86	69.70
	B	90.00	75.00	80.00	81.67	71.43
	C	80.00	88.89	70.00	79.63	64.00
Day 2 % Met	A	88.89	92.86	100.00	93.92	88.46
	B	77.78	78.57	90.00	82.12	92.31
	C	88.89	78.57	90.00	85.82	
Day 3 % Met	A	88.89	91.67	90.00	90.19	
	B	88.89	100.00	95.00	94.63	
	C	83.33	91.67	85.00	86.67	
Day 4 % Met	A	94.44	85.71	95.00	91.72	
	B	88.89	92.86	100.00	93.92	
	C	83.33	92.86	85.00	87.06	
Day 5 % Met	A	95.00	100.00	100.00	98.33	96.30
	B	95.00	100.00	90.91	95.30	88.00
	C	95.00	93.75	95.45	94.73	84.62
Across Sessions						81.85 (11.85)
Average *M*(SD)	A	89.44 (6.03)	82.38 (23.32)	95.18 (4.78)	89.00 (10.60)	
	B	88.11 (6.30)	89.29 (11.85)	91.18 (7.40)	89.53 (6.99)	
	C	86.11 (5.91)	89.15 (6.19)	85.09 (9.48)	86.78 (5.37)	
Effect Size	A to B	0.24	-0.42	0.72	-0.07	
	A to C	0.62	-0.44	1.50	0.30	
	B to C	0.37	0.02	0.80	0.49	

Note. Percetage of points awarded for session based on items scored. Cohort A led by University Trainer. Cohorts B and C led by State Trainers.

Table 6.

Coaches Attendance and Coaches' Dosage by Cohort.

Training Day	Cohort	After Sessions Coaches Meetings With Teams (Count)			
		No. Teams Met	No. Teams Not Met	Missing	No. Meetings *M* (*SD*); Range
After Day 1	A	2	13	0	5.93 (5.48); 1-15
	B	1	25	1	2.39 (1.47); 1-6
	C	5	19	1	2.19 (1.22); 1-5
After Day ay 2	A	2	13	0	2.29 (1.38); 1-4
	B	3	23	1	1.84 (1.01); 1-4
	C	7	17	1	1.91 (1.04); 1-4
After Day 3	A	3	12	0	1.57 (1.13); 1-4
	B	1	25	1	2.07 (1.14); 1-4
	C	5	19	1	2.08 (0.79); 1-3
After Day 4	A	0	15	0	3.26 (3.11); 1-9
	B	1	25	1	2.15 (1.57); 1-6
	C	2	22	1	3.00 (1.95); 1-7
Across Days *M* (*SD*)	A	1.76 (1.26)			
	B	1.50 (1.00)			
	C	4.75 (2.06)			

Note. Cohort A led by University Trainer. Cohorts B and C led by State Trainers. Abs. = absent, No. = number, and Prtl = partial.

Table 7.
Formative Assessment Pre-Test and Post-Test.

Construct	Cohort	Time		Effect Size Cohen's *d*
		Pre-Formative assessment *M* (*SD*) *n*	Post-Formative assessment *M* (*SD*) *n*	
Day 1	A	6.22 (1.82) 76	7.85 (1.65) 76	0.94
	B	6.15 (2.94) 137	8.00 (2.86) 137	0.64
	C	6.11 (2.94) 129	7.66 (2.82) 129	0.54
Day 2	A	6.53 (1.90) 76	7.98 (1.57) 76	0.83
	B	6.34 (3.03) 137	7.39 (2.67) 137	0.37
	C	6.34 (3.12) 129	7.79 (2.71) 129	0.50
Day 3	A	6.11 (3.44) 76	6.76 (3.23) 76	0.19
	B	5.91 (5.30) 137	5.69 (13.64) 137	-0.02
	C	5.61 (5.41) 129	7.20 (5.41) 129	0.29
Day 4	A	5.23 (3.44) 76	7.18 (3.07) 76	0.60
	B	4.84 (5.54) 137	7.03 (4.57) 137	0.43
	C	5.02 (5.35) 129	7.42 (3.99) 129	0.51
Day 5	A	7.01 (4.59) 76	8.23 (2.64) 76	0.33
	B	6.12 (6.28) 137	7.49 (4.00) 137	0.26
	C	6.65 (6.50) 129	7.96 (3.92) 129	0.24

Note: Information is representative of pooled, multiply imputed data. Cohort A led by University Trainer. Cohorts B and C led by State Trainers.

Table 8.
Results of Multiple Regression from Pooled Multiply Imputed Sets on Formative Assessment, Sessions 1-5: Difference and Post Scores.

Construct	Est	SE	*t*	df	*p*	95 CI
Difference Day 1						
Reference Group (Intercept)	1.81	0.64	2.84	214.88	0.01	0.55 - 3.06
Cohort B	0.21	0.29	0.73	208.88	0.47	-0.36 - 0.78
Cohort C	-0.12	0.30	-0.41	195.12	0.68	-0.71 - 0.47
Special Educator	0.37	0.40	0.92	232.36	0.36	-0.42 - 1.17
Administrator	0.06	0.40	0.15	239.45	0.88	-0.72 - 0.84
Related Service provider	-0.09	0.36	-0.24	254.46	0.81	-0.8 - 0.62
Staff	-0.23	1.12	-0.21	122.93	0.84	-2.45 - 1.98
Teacher of Student	0.06	0.35	0.16	181.58	0.87	-0.63 - 0.74
Years' Experience	<0.01	0.02	0.22	191.92	0.83	-0.04 - 0.04
Master's Degree	-0.02	0.38	-0.05	221.40	0.96	-0.76 - 0.72
Master's+30 units	0.30	0.43	0.69	212.07	0.49	-0.55 - 1.15
Doctoral Degree	-0.30	0.54	-0.54	243.37	0.59	-1.37 - 0.78
Age	-0.01	0.02	-0.44	215.37	0.66	-0.04 - 0.03
Post Day 1						
Reference Group (Intercept)	5.61	0.68	8.23	189.01	<0.01	4.27 - 6.96
Cohort B	0.18	0.23	0.77	240.02	0.44	-0.28 - 0.64
Cohort C	-0.09	0.24	-0.38	227.96	0.70	-0.57 - 0.38
Pretest	0.37	0.07	5.11	142.04	<0.01	0.22 - 0.51
Special Educator	0.63	0.33	1.88	249.20	0.06	-0.03 - 1.28
Administrator	0.35	0.34	1.05	236.40	0.29	-0.31 - 1.02
Related Service provider	0.49	0.31	1.59	259.05	0.11	-0.12 - 1.09
Staff	0.38	0.93	0.41	128.58	0.68	-1.45 - 2.22
Teacher of Student	0.10	0.28	0.37	203.54	0.71	-0.46 - 0.66
Years' Experience	0.01	0.02	0.31	202.66	0.76	-0.03 - 0.04
Master's Degree	-0.04	0.32	-0.11	223.85	0.91	-0.66 - 0.59
Master's+30 units	0.22	0.35	0.62	226.83	0.54	-0.48 - 0.92
Doctoral Degree	0.37	0.46	0.80	239.63	0.42	-0.54 - 1.29
Age	-0.01	0.01	-1.02	219.11	0.31	-0.04 - 0.01
Difference Day 2						
Reference Group (Intercept)	0.55	0.77	0.72	175.47	0.47	-0.96 - 2.06
Cohort B	-0.35	0.33	-1.08	204.71	0.28	-1 - 0.29
Cohort C	0.01	0.35	0.02	174.24	0.98	-0.68 - 0.70
Special Educator	-0.89	0.47	-1.88	208.35	0.06	-1.82 - 0.04
Administrator	-0.53	0.53	-0.99	137.62	0.32	-1.58 - 0.53

Construct	Est	SE	*t*	df	*p*	95 CI
Related Service provider	-0.44	0.44	-0.99	192.47	0.32	-1.31 - 0.43
Staff	-1.88	1.17	-1.60	151.54	0.11	-4.19 - 0.44
Teacher of Student	0.47	0.41	1.15	161.89	0.25	-0.34 - 1.28
Years' Experience	-0.02	0.02	-0.80	142.64	0.42	-0.07 - 0.03
Master's Degree	0.14	0.43	0.32	205.76	0.75	-0.72 - 0.99
Master's+30 units	-0.37	0.48	-0.77	225.79	0.44	-1.31 - 0.57
Doctoral Degree	-0.29	0.65	-0.44	206.51	0.66	-1.56 - 0.99
Age	0.04	0.02	1.74	145.86	0.08	-0.01 - 0.08
Post Day 2						
Reference Group (Intercept)	7.40	0.83	8.95	136.98	<0.01	5.76 - 9.03
Cohort B	-0.55	0.23	-2.38	235.69	0.02	-1.01 - -0.1
Cohort C	-0.13	0.24	-0.54	216.29	0.59	-0.61 - 0.35
Pretest	0.11	0.08	1.28	91.02	0.20	-0.06 - 0.28
Special Educator	0.14	0.34	0.42	239.57	0.68	-0.53 - 0.81
Administrator	0.14	0.36	0.39	193.27	0.70	-0.56 - 0.84
Related Service provider	0.34	0.32	1.06	222.27	0.29	-0.29 - 0.96
Staff	-0.83	0.90	-0.92	135.46	0.36	-2.61 - 0.96
Teacher of Student	<0.01	0.27	0.01	243.91	0.99	-0.52 - 0.53
Years' Experience	<0.01	0.02	0.18	213.96	0.86	-0.03 - 0.03
Master's Degree	-0.24	0.30	-0.78	251.00	0.43	-0.83 - 0.36
Master's+30 units	-0.52	0.34	-1.51	248.11	0.13	-1.19 - 0.16
Doctoral Degree	-0.27	0.45	-0.61	253.06	0.54	-1.15 - 0.61
Age	<0.01	0.01	-0.14	190.88	0.89	-0.03 - 0.03
Difference Day 3						
Reference Group (Intercept)	-0.04	1.56	-0.02	93.20	0.98	-3.13 - 3.06
Cohort B	-0.90	1.26	-0.71	31.60	0.48	-3.46 - 1.67
Cohort C	0.87	0.65	1.33	114.86	0.18	-0.42 - 2.16
Special Educator	-0.89	0.94	-0.95	112.50	0.35	-2.74 - 0.97
Administrator	-0.60	0.91	-0.66	118.32	0.51	-2.4 - 1.2
Related Service provider	-0.39	0.88	-0.45	106.94	0.66	-2.13 - 1.34
Staff	-1.08	1.99	-0.55	130.53	0.59	-5.02 - 2.85
Teacher of Student	0.33	0.74	0.45	114.82	0.66	-1.14 - 1.8
Years' Experience	0.01	0.04	0.27	150.90	0.79	-0.07 - 0.09
Master's Degree	0.49	0.98	0.49	81.61	0.62	-1.47 - 2.44
Master's+30 units	0.44	1.11	0.39	81.24	0.70	-1.78 - 2.65
Doctoral Degree	0.11	1.35	0.08	97.96	0.93	-2.57 - 2.79
Age	0.01	0.04	0.33	100.30	0.74	-0.06 - 0.09

Construct	Est	SE	*t*	df	*p*	95 CI
Post Day 3						
Reference Group (Intercept)	4.81	1.79	2.68	64.06	0.01	1.22 - 8.39
Cohort B	-0.99	1.17	-0.85	27.34	0.40	-3.39 - 1.4
Cohort C	0.64	0.50	1.29	158.90	0.20	-0.34 - 1.62
Pretest	0.24	0.15	1.55	47.69	0.13	-0.07 - 0.55
Special Educator	0.07	0.84	0.08	100.44	0.94	-1.61 - 1.74
Administrator	-0.29	0.76	-0.38	123.73	0.71	-1.8 - 1.22
Related Service provider	0.35	0.74	0.47	109.91	0.64	-1.13 - 1.82
Staff	-0.84	1.71	-0.49	127.05	0.62	-4.23 - 2.54
Teacher of Student	0.43	0.57	0.74	150.92	0.46	-0.71 - 1.56
Years’ Experience	0.02	0.03	0.60	175.49	0.55	-0.04 - 0.08
Master's Degree	0.29	0.84	0.34	81.02	0.73	-1.39 - 1.96
Master's+30 units	0.66	0.96	0.69	78.78	0.49	-1.26 - 2.58
Doctoral Degree	0.97	1.18	0.82	93.62	0.41	-1.37 - 3.31
Age	-0.01	0.03	-0.30	109.79	0.77	-0.07 - 0.05
Difference Day 4						
Reference Group (Intercept)	1.43	1.10	1.31	125.16	0.19	-0.74 - 3.6
Cohort B	0.32	0.54	0.60	99.44	0.55	-0.75 - 1.38
Cohort C	0.46	0.51	0.91	117.77	0.37	-0.55 - 1.48
Special Educator	0.05	0.69	0.08	135.92	0.94	-1.31 - 1.42
Administrator	0.60	0.72	0.83	118.53	0.41	-0.82 - 2.03
Related Service provider	-0.16	0.62	-0.26	142.57	0.79	-1.39 - 1.07
Staff	0.04	1.49	0.03	154.41	0.98	-2.9 - 2.97
Teacher of Student	0.04	0.55	0.07	135.19	0.95	-1.06 - 1.13
Years’ Experience	-0.02	0.03	-0.62	112.08	0.54	-0.09 - 0.05
Master's Degree	-0.20	0.61	-0.34	153.43	0.74	-1.4 - 0.99
Master's+30 units	0.26	0.71	0.37	136.37	0.71	-1.15 - 1.68
Doctoral Degree	-0.02	1.01	-0.02	113.64	0.98	-2.02 - 1.97
Age	0.02	0.03	0.63	137.78	0.53	-0.04 - 0.07
Post Day 4						
Reference Group (Intercept)	5.17	1.08	4.79	85.38	<0.01	3.02 - 7.32
Cohort B	0.03	0.38	0.08	123.50	0.94	-0.73 - 0.79
Cohort C	0.38	0.34	1.12	181.25	0.27	-0.29 - 1.06
Pretest	0.30	0.12	2.45	37.45	0.02	0.05 - 0.55
Special Educator	0.77	0.51	1.52	162.88	0.13	-0.23 - 1.77
Administrator	0.97	0.53	1.82	135.51	0.07	-0.09 - 2.02
Related Service provider	0.52	0.46	1.12	165.83	0.26	-0.39 - 1.43
Staff	-0.51	1.12	-0.45	170.40	0.65	-2.71 - 1.7

Construct	Est	SE	*t*	df	*p*	95 CI
Teacher of Student	0.37	0.41	0.89	151.78	0.37	-0.45 - 1.19
Years' Experience	-0.01	0.02	-0.44	148.81	0.66	-0.06 - 0.04
Master's Degree	<0.01	0.43	<0.01	204.04	1.00	-0.85 - 0.85
Master's+30 units	0.44	0.49	0.89	200.92	0.37	-0.53 - 1.4
Doctoral Degree	0.72	0.67	1.08	177.03	0.28	-0.6 - 2.05
Age	-0.01	0.02	-0.29	163.18	0.77	-0.05 - 0.03
Difference Day 5						
Reference Group (Intercept)	1.33	1.25	1.06	87.14	0.29	-1.15 - 3.8
Cohort B	0.05	0.57	0.09	84.16	0.93	-1.07 - 1.18
Cohort C	-0.02	0.57	-0.03	85.12	0.98	-1.16 - 1.13
Special Educator	-1.85	0.77	-2.41	98.14	0.02	-3.37 - -0.32
Administrator	-0.78	0.85	-0.92	76.49	0.36	-2.48 - 0.92
Related Service provider	-1.28	0.78	-1.64	79.10	0.10	-2.82 - 0.27
Staff	-0.82	1.54	-0.53	132.33	0.60	-3.85 - 2.22
Teacher of Student	-0.12	0.68	-0.17	78.12	0.86	-1.48 - 1.24
Years' Experience	-0.03	0.04	-0.80	103.80	0.43	-0.1 - 0.04
Master's Degree	0.12	0.66	0.18	112.41	0.86	-1.2 - 1.44
Master's+30 units	-0.23	0.77	-0.29	106.44	0.77	-1.75 - 1.3
Doctoral Degree	-0.22	0.98	-0.22	115.85	0.83	-2.16 - 1.73
Age	0.03	0.03	1.03	99.76	0.30	-0.03 - 0.09
Post Day 5						
Reference Group (Intercept)	6.89	0.91	7.54	92.86	<0.01	5.08 - 8.71
Cohort B	-0.54	0.36	-1.48	94.00	0.14	-1.25 - 0.18
Cohort C	-0.18	0.33	-0.55	121.51	0.58	-0.84 - 0.47
Pretest	0.29	0.10	3.04	34.56	<0.01	0.1 - 0.48
Special Educator	-0.64	0.45	-1.42	139.23	0.16	-1.54 - 0.25
Administrator	-0.38	0.48	-0.79	113.70	0.43	-1.33 - 0.57
Related Service provider	-0.34	0.42	-0.83	137.63	0.41	-1.17 - 0.48
Staff	-0.77	0.95	-0.80	161.26	0.42	-2.65 - 1.12
Teacher of Student	-0.37	0.36	-1.04	141.61	0.30	-1.07 - 0.33
Years' Experience	<0.01	0.02	-0.03	108.46	0.98	-0.05 - 0.04
Master's Degree	-0.01	0.38	-0.03	168.70	0.97	-0.77 - 0.74
Master's+30 units	-0.15	0.45	-0.34	149.69	0.74	-1.04 - 0.74
Doctoral Degree	0.54	0.58	0.92	159.48	0.36	-0.61 - 1.69
Age	-0.01	0.02	-0.37	148.59	0.71	-0.04 - 0.03

Note. Reference group refers to trainees (FABI Team Members) in Cohort A, who are general educators, with a bachelor's degree. Cohort A led by University Trainer. Cohorts B and C led by State Trainers. 95 CI = 95% confidence interval, and Est. = *beta* estimate.

Table 9.
Knowledge, Confidence, and Use Pre-Test and Post-Test.

Construct	Cohort	Time		Effect Size Cohen's *d*
		Pre-Series *M* (*SD*) *n*	Post-Series *M* (*SD*) *n*	
Perceived Knowledge	A	16.03 (11.45) 76	33.44 (8.84) 76	1.70
	B	15.41 (19.07) 137	32.12 (13.42) 137	1.01
	C	15.07 (18.83) 129	32.77 (13.14) 129	1.09
Perceived Confidence	A	13.31 (11.48) 76	31.69 (9.26) 76	1.76
	B	15.00 (19.20) 137	30.39 (14.19) 137	0.91
	C	13.97 (18.85) 129	30.73 (13.76) 129	1.02
Perceived Usefulness	A	23.24 (18.31) 76	38.26 (10.26) 76	1.01
	B	23.68 (29.28) 137	34.25 (15.77) 137	0.45
	C	26.14 (29.18) 129	33.56 (15.17) 129	0.32
Actual Knowledge	A	31.34 (5.33) 76	36.73 (5.74) 76	0.97
	B	31.50 (8.97) 137	34.88 (9.04) 137	0.38
	C	31.46 (8.87) 129	37.30 (8.79) 129	0.66

Note: Information is representative of pooled, multiply imputed data. Cohort A led by University Trainer. Cohorts B and C led by State Trainers. Range: 0 to 45, with larger numbers indicating greater knowledge, confidence, or usefulness…

Table 10.

Results of Multiple Regression from Pooled Multiply Imputed Sets on Knowledge, Confidence, and Use Pre: Difference and Post Scores.

Construct	Est	SE	*t*	df	*p*	95 CI
Perceived Knowledge (Difference)						
Reference Group (Intercept)	26.01	3.46	7.53	232.19	<0.01	19.2 - 32.82
Cohort B	-1.72	1.50	-1.14	256.44	0.25	-4.67 - 1.24
Cohort C	-1.38	1.58	-0.87	228.86	0.39	-4.5 - 1.75
Special Educator	-5.74	2.24	-2.56	233.75	0.01	-10.15 - -1.33
Administrator	-5.37	2.26	-2.38	221.03	0.02	-9.82 - -0.92
Related Service provider	-6.39	2.02	-3.16	246.01	<0.01	-10.37 - -2.4
Staff	3.31	5.52	0.60	173.05	0.55	-7.57 - 14.2
Teacher of Student	1.50	1.77	0.84	242.35	0.40	-2 - 4.99
Years' Experience	0.10	0.11	0.94	204.05	0.35	-0.11 - 0.32
Master's Degree	-0.52	1.97	-0.27	264.77	0.79	-4.41 - 3.36
Master's+30 units	-2.66	2.22	-1.20	270.67	0.23	-7.02 - 1.7
Doctoral Degree	-11.75	2.93	-4.01	268.27	0.00	-17.52 - -5.98
Age	-0.08	0.09	-0.86	220.50	0.39	-0.26 - 0.1
Perceived Knowledge (Post)						
Reference Group (Intercept)	29.98	2.56	11.69	211.04	<0.01	24.93 - 35.03
Cohort B	-1.28	1.10	-1.16	236.41	0.25	-3.45 - 0.89
Cohort C	-0.35	1.14	-0.31	226.78	0.76	-2.6 - 1.9
Pretest	0.25	0.05	4.73	181.08	<0.01	0.14 - 0.35
Special Educator	1.85	1.74	1.06	205.22	0.29	-1.59 - 5.29
Administrator	0.10	1.69	0.06	206.83	0.95	-3.24 - 3.43
Related Service provider	0.95	1.52	0.63	247.67	0.53	-2.04 - 3.95
Staff	2.15	4.29	0.50	136.13	0.62	-6.32 - 10.63
Teacher of Student	1.41	1.25	1.13	255.58	0.26	-1.06 - 3.87
Years' Experience	0.06	0.08	0.69	171.95	0.49	-0.11 - 0.22
Master's Degree	-0.25	1.42	-0.18	260.64	0.86	-3.05 - 2.55
Master's+30 units	-0.01	1.62	-0.01	256.64	0.99	-3.21 - 3.18
Doctoral Degree	-0.04	2.28	-0.02	247.72	0.98	-4.53 - 4.44
Age	-0.05	0.07	-0.76	191.79	0.45	-0.18 - 0.08
Perceived Confidence (Difference)						
Reference Group (Intercept)	24.61	3.67	6.71	233.45	<0.01	17.39 - 31.84
Cohort B	-3.96	1.60	-2.47	251.42	0.01	-7.12 - -0.8
Cohort C	-3.10	1.65	-1.88	243.37	0.06	-6.36 - 0.15
Special Educator	-5.32	2.41	-2.21	223.34	0.03	-10.08 - -0.57
Administrator	-5.72	2.44	-2.34	208.91	0.02	-10.53 - -0.91
Related Service provider	-5.64	2.21	-2.56	226.10	0.01	-9.99 - -1.29
Staff	1.01	5.79	0.17	179.75	0.86	-10.43 - 12.44
Teacher of Student	0.30	1.90	0.16	235.93	0.87	-3.44 - 4.05
Years' Experience	0.14	0.12	1.16	185.61	0.25	-0.1 - 0.37

Construct	Est	SE	*t*	df	*p*	95 CI
Master's Degree	1.68	2.13	0.79	252.26	0.43	-2.52 - 5.87
Master's+30 units	-0.94	2.37	-0.40	263.86	0.69	-5.61 - 3.74
Doctoral Degree	-10.00	3.19	-3.13	247.28	<0.01	-16.29 - -3.7
Age	-0.07	0.10	-0.76	215.94	0.45	-0.26 - 0.12
Perceived Confidence (Post)						
Reference Group (Intercept)	27.28	2.64	10.34	227.17	<0.01	22.08 - 32.48
Cohort B	-1.70	1.18	-1.44	231.74	0.15	-4.02 - 0.63
Cohort C	-0.82	1.19	-0.69	243.54	0.49	-3.16 - 1.51
Pretest	0.22	0.05	4.05	180.66	<0.01	0.11 - 0.32
Special Educator	3.45	1.89	1.82	192.13	0.07	-0.29 - 7.18
Administrator	0.13	1.81	0.07	196.48	0.94	-3.44 - 3.71
Related Service provider	1.59	1.64	0.97	223.18	0.33	-1.65 - 4.83
Staff	0.56	4.63	0.12	127.87	0.90	-8.59 - 9.72
Teacher of Student	1.20	1.35	0.89	240.74	0.37	-1.45 - 3.86
Years' Experience	0.07	0.09	0.80	180.85	0.42	-0.1 - 0.24
Master's Degree	0.58	1.52	0.38	250.60	0.71	-2.42 - 3.57
Master's+30 units	0.57	1.70	0.34	260.15	0.74	-2.77 - 3.92
Doctoral Degree	1.48	2.41	0.62	239.76	0.54	-3.26 - 6.22
Age	-0.03	0.07	-0.49	219.34	0.62	-0.17 - 0.1
Perceived Use (Difference)						
Reference Group (Intercept)	16.86	6.05	2.79	163.31	0.01	4.91 - 28.81
Cohort B	-5.29	2.57	-2.06	193.52	0.04	-10.35 - -0.23
Cohort C	-8.54	2.72	-3.13	171.05	<0.01	-13.91 - -3.16
Special Educator	-0.94	3.67	-0.26	204.09	0.80	-8.17 - 6.29
Administrator	-3.89	4.01	-0.97	149.45	0.33	-11.81 - 4.04
Related Service provider	-4.57	3.61	-1.27	163.53	0.21	-11.69 - 2.55
Staff	-8.38	9.75	-0.86	122.72	0.39	-27.69 - 10.92
Teacher of Student	0.41	3.08	0.13	175.78	0.89	-5.66 - 6.48
Years' Experience	0.14	0.19	0.75	159.98	0.45	-0.23 - 0.51
Master's Degree	2.93	3.55	0.82	170.67	0.41	-4.08 - 9.93
Master's+30 units	-0.45	4.07	-0.11	163.76	0.91	-8.48 - 7.57
Doctoral Degree	-4.97	5.09	-0.98	193.70	0.33	-15.01 - 5.06
Age	-0.03	0.16	-0.18	152.01	0.86	-0.34 - 0.29
Perceived Use (Post)						
Reference Group (Intercept)	33.99	3.19	10.65	213.03	<0.01	27.7 - 40.28
Cohort B	-3.83	1.34	-2.86	242.66	<0.01	-6.46 - -1.19
Cohort C	-4.68	1.36	-3.44	250.62	<0.01	-7.35 - -2
Pretest	0.11	0.05	2.34	123.21	0.02	0.02 - 0.2
Special Educator	4.23	2.00	2.11	223.89	0.04	0.29 - 8.16
Administrator	1.27	2.06	0.62	197.77	0.54	-2.79 - 5.33
Related Service provider	1.33	1.85	0.72	219.78	0.47	-2.31 - 4.98
Staff	0.87	6.05	0.14	94.95	0.89	-11.13 - 12.88

Construct	Est	SE	*t*	df	*p*	95 CI
Teacher of Student	-0.50	1.55	-0.32	243.70	0.75	-3.55 - 2.56
Years' Experience	-0.10	0.10	-1.04	183.33	0.30	-0.3 - 0.09
Master's Degree	0.95	1.77	0.53	244.27	0.59	-2.55 - 4.44
Master's+30 units	1.30	2.04	0.64	230.49	0.53	-2.72 - 5.32
Doctoral Degree	3.20	2.67	1.20	240.95	0.23	-2.07 - 8.47
Age	0.02	0.08	0.30	206.61	0.77	-0.14 - 0.18
Actual Knowledge (Difference)						
Reference Group (Intercept)	7.70	1.95	3.96	234.33	<0.01	3.87 - 11.53
Cohort B	-2.16	0.84	-2.57	263.92	0.01	-3.81 - -0.51
Cohort C	0.34	0.87	0.39	250.50	0.69	-1.37 - 2.06
Special Educator	0.69	1.24	0.55	248.13	0.58	-1.76 - 3.13
Administrator	1.86	1.28	1.46	219.42	0.15	-0.65 - 4.38
Related Service provider	2.18	1.16	1.88	234.95	0.06	-0.1 - 4.47
Staff	2.85	2.96	0.96	205.25	0.34	-2.98 - 8.68
Teacher of Student	0.01	1.01	0.01	232.51	0.99	-1.98 - 2.01
Years' Experience	0.04	0.06	0.65	201.90	0.52	-0.08 - 0.16
Master's Degree	-1.78	1.16	-1.53	232.32	0.13	-4.06 - 0.51
Master's+30 units	-3.67	1.33	-2.76	220.94	0.01	-6.3 - -1.05
Doctoral Degree	-4.73	1.75	-2.70	222.47	0.01	-8.18 - -1.27
Age	-0.05	0.05	-0.93	244.85	0.35	-0.14 - 0.05
Actual Knowledge (Post)						
Reference Group (Intercept)	26.65	2.70	9.88	165.26	<0.01	21.32 - 31.98
Cohort B	-1.99	0.71	-2.79	251.55	0.01	-3.39 - -0.58
Cohort C	0.63	0.72	0.87	255.27	0.38	-0.8 - 2.06
Pretest	0.40	0.06	6.21	160.22	<0.01	0.27 - 0.52
Special Educator	1.74	1.05	1.66	244.84	0.10	-0.32 - 3.8
Administrator	2.03	1.10	1.85	199.97	0.07	-0.14 - 4.2
Related Service provider	2.31	0.95	2.43	249.30	0.02	0.44 - 4.19
Staff	2.30	2.61	0.88	172.43	0.38	-2.85 - 7.45
Teacher of Student	-0.20	0.83	-0.25	249.24	0.81	-1.84 - 1.43
Years' Experience	0.04	0.05	0.71	197.20	0.48	-0.07 - 0.14
Master's Degree	-1.26	0.94	-1.34	258.33	0.18	-3.12 - 0.59
Master's+30 units	-2.15	1.11	-1.94	232.06	0.05	-4.33 - 0.03
Doctoral Degree	-0.82	1.47	-0.56	243.26	0.58	-3.72 - 2.08
Age	-0.08	0.04	-1.84	237.44	0.07	-0.16 - 0.01

Note. Reference group refers to trainees (FABI Team Members) in Cohort A, who are general educators, with a bachelor's degree. Cohort A led by University Trainer. Cohorts B and C led by State Trainers. 95 CI = 95% confidence interval, and Est. = *beta* estimate.

Table 11

Results of Multiple Regression from Pooled Multiply Imputed Sets on Teams Demonstrating Functional Relation.

Demonstrate Functional Relation	Est	SE	*t*	df	*p*	95 CI
Reference Group (Intercept)	0.30	0.17	1.75	160.22	0.08	-0.04 - 0.65
Cohort B	-0.03	0.12	-0.24	61.92	0.81	-0.26 - 0.2
Cohort C	0.04	0.12	0.34	62.35	0.73	-0.2 - 0.28
Special Educator	-0.15	0.10	-1.50	222.48	0.14	-0.35 - 0.05
Administrator	-0.09	0.09	-0.97	273.96	0.33	-0.28 - 0.09
Related Service provider	-0.09	0.09	-1.01	225.40	0.31	-0.28 - 0.09
Staff	-0.07	0.22	-0.31	251.66	0.75	-0.5 - 0.37
Teacher of Student	-0.04	0.08	-0.52	261.96	0.60	-0.19 - 0.11
Years' Experience	<0.01	<0.01	-0.55	255.44	0.58	-0.01 - 0.01
Master's Degree	0.13	0.10	1.35	188.65	0.18	-0.06 - 0.33
Master's+30 units	0.02	0.11	0.17	180.38	0.86	-0.2 - 0.24
Doctoral Degree	-0.02	0.15	-0.16	190.08	0.87	-0.31 - 0.26
Age	<0.01	<0.01	-0.04	254.61	0.97	-0.01 - 0.01

Note. Reference group refers to trainees (FABI Team Members) in Cohort A, who are general educators, with a bachelor's degree. Cohort A led by University Trainer. Cohorts B and C led by State Trainers. 95 CI = 95% confidence interval, and Est. = *beta* estimate.

	C	**Step: 1 →**		**Step 2: →**		**Step** 3: **→**		**Step 4: →**		**Step 5:**	
Step Overview		Selected student for FABI. Reviewed Educational Records.		Conducted parent, teacher, and student interviews. Operationally defined target and replacement behavior. Collected A-B-C- Data. Organized data using the Function Matrix to create a hypothesis.		Selected dimension of behavior to align with appropriate measurement system. Primary and secondary observers trained for reliability. Began data collection.		Selected method using the Function-based Intervention Decision Model. Drafted intervention using A-R-E components. Created treatment integrity form. Collected pre-intervention social validity.		Introduced intervention and began data collection. Collected treatment integrity data. Withdrew intervention and collected data. Reintroduced intervention and collected data. Collected post-intervention social validity.	
	C	M	*n* (%)	M	*n* (%)	M	*n* (%)	M	*n* (%)	M	*n* (%)
Start	A	0	15 (100)	0	15 (100)	0	14 (93.33)	3	12 (100)	0	14 (93.33)
	B	1	26 (100)	2	25 (100)	1	25 (96.15)	7	18 (90.00)	2	23 (92.00)
	C	1	24 (100)	1	24 (100)	2	23 (100)	9	15 (93.72)	2	22 (95.65)
	T	2	65 (100)	3	64 (100)	3	62 (96.87)	19	4 (93.65)	4	59 (93.65)
	C		*M* (*SD*)		*M* (*SD*)		*M* (*SD*)		*M* (*SD*)		*M* (*SD*)
Comp	A	0	98.52 (3.91)	0	87.01 (13.20)	0	73.89 (32.59)	3	72.22 (22.75)	0	60.49 (31.06)
	B	1	94.87 (10.99)	2	85.85 (7.14)	1	58.55 (25.58)	7	70.37 (29.68)	2	59.19 (34.43)
	C	1	99.07 (4.54)	1	88.68 (6.54)	2	71.74 (24.67)	9	78.70 (22.32)	2	70.37 (32.15)
	T	2	97.26 (7.86)	3	87.18 (8.68)	3	66.88 (27.52)	19	73.61 (25.50)	4	63.58 (32.72)
Qual	A	0	98.52 (3.91)	7	76.92 (5.13)	10	76.67 (11.88)	15	--	14	85.19 (0)
	B	4	99.03 (3.20)	10	72.25 (5.38)	24	80.56 (9.62)	23	84.26 (12.96)	27	--
	C	1	98.15 (4.23)	7	71.79 (6.22)	23	88.89 (10.48)	23	88.89 (10.48)	22	77.16 (13.14)
	T	5	98.57 (3.76)	24	72.93 (5.90)	55	73.38 (14.43)	61	85.80 (11.34)	63	79.17 (11.45)

Figure 1. Summary of FABI Step Completion

Note. Step completion and step quality composite scores following pair-wise deletion. Cohort A led by University Trainer. Cohorts B and C led by State Trainers. C = Cohort, Comp = Step completion, M = Missing, T = Total (across cohorts), and Qual = Step Quality.

Chapter 4:

Conceptual Article

Embedding Functional Assessment-based Interventions into Schools: The Transportability of Evidence-based Practices

Students with and at-risk for emotional behavior disorders (EBD) are among the most challenging students to support. This label is reserved for students who persistently engage in behavior or emotional responses so different from appropriate age, cultural, or ethnic norms, it adversely affects their educational performance, including academic, social, vocational, and personal skills (Council for Children with Behavioral Disorders, 2000). While special education serves less than 1% of the total school population under the category of emotional disturbance, point prevalence estimates indicate 12% of school-age students have moderate to severe EBD (Forness, Freeman, Paparella, Kauffman, & Walker, 2012). In addition, upwards of 80% of all students will have or have had an EBD before graduating high school (Forness et al., 2012). As such, most students with and at-risk for EBD will be educated in the general education context, supported only by general education teachers, making it imperative general educators are equipped to prevent and respond to the development of learning and behavior problems (Lane, Oakes, Menzies, & Harris, 2013).

Fortunately, leaders in education are increasingly answering calls to meet the academic, behavior, and social needs of all students (Yudin, 2014). This requires (a) general education and special education teachers, as well as related service providers to work in tandem and (b) the development of site- and staff-level capacity to support early detection and responding within a building. While many educators graduate from preservice teacher preparation programs fully equipped to meet students' academic behavior, and social needs, others enter the profession not yet prepared to meet the demands of addressing complex behavioral and social needs (Allday, Neilsen-Gatti, & Hudson, 2013; Lambert, McCarthy, O'Donnell, & Wang, 2009;).

In the recent decades, many school organizations have shifted away from the "within-child" approach to serving students with EBD which entailed referring-testing-placing students outside of traditional general education settings to a more inclusive service delivery approach (Lane, Oakes, Menzies, Harris, 2013; Shinn, 1986). Increasingly, schools have shifted towards a systems-level, ecological, and preventative approach, with the goal of referring, consulting, and intervening (Sugai & Horner, 2002). Notably, schools have responded to the calls of supporting the whole child by designing, installing, and sustaining systems-level perspectives to accomplish coordinating efforts in supporting the multiple needs of students by offering graduated supports with increasing intensity.

Three-tiered models of support organize (a) primary prevention (Tier 1, *for all*) to prevent harm, (b) secondary prevention (Tier 2, *for some*) to reverse harm, and (c) tertiary prevention (Tier 3, *for few*) to reduce harm. Three tiered models might target academics, such as response to intervention (RTI; Fuchs, Fuchs, & Compton, 2012); behavior, such as positive behavioral interventions and supports (PBIS, Horner & Sugai, 2015); or a blending of academic, behavior, and social supports, such as comprehensive, integrated, three-tiered (Ci3T) models of prevention (Lane, Oakes, & Menzies, 2014). Across levels of support, schools focus their efforts on preventing learning, behavior, and social challenges from occurring, rather than waiting for challenges to arise and then respond with punitive consequence-based or reactive-based interventions (Lane & Walker, 2015). Implementation of three-tiered models, such as PBIS for behavior is associated with reduction in students' office discipline referrals, suspensions and expulsions, as well as improvements in students' social-emotional competencies, and improved academic outcomes (Horner & Sugai, 2015).

Finding What Works: From Research to Practice

At every level of prevention, schools strive to implement *what works in education*. In the last few decades, schools have seen an increased focus on the importance of promoting and assuring the use of evidence-based practices (EBP) in classrooms. EBPs represents the idea that there is sufficient scientific evidence on the efficacy of specific program, product, practice, or policy (hereby referred to as practice). The development and dissemination of EBPs have in part been facilitated by recent advances in the (a) scientific methods to summarize the state of knowledge and impact of practices (e.g., Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009); (b) statistical tools to synthesize results across different studies, as well as to measure the size of effects (e.g., Shadish, Hedges, Horner & Odom, 2015); and (c) theoretical frameworks used to classify studies to improve practices (e.g., Council for Exceptional Children, 2014; Taxman & Belenko, 2012).

When the evidence-based practice movement began across areas of health and social services – medicine, education, social work, criminal justice, addiction treatment – a major assumption was that the main challenge would be in conducting applied research to determine whether a program was effective. It was believed, once a practice was identified as evidence-based, organizations would enthusiastically rush to implement said practices with fidelity. The reality was, it takes many years for an EBP to become sustainable. For example, in medicine, a staggering 36,000 randomized controlled trials are published every year, yet it takes on average 17 to 20 years for findings to reach clinical practices (Kanter, Schottinger, & Whittaker, 2017).

Increasingly, researchers, practitioners, and policy-makers alike are interested in the time lag between science development and utilization. Implementation science examines how organizations effectively implement and sustain new or modified practices (Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005). Looking beyond the question of *what works in education*, new questions are being asked around *utilizing what works*. Knowledge utilization refers to how practitioners and policymakers apply scientific knowledge to an already existing organization or community. The accumulation of knowledge in *what works* has led to a great need for researchers, organizations, and policymakers to understand the process of determining what qualifies as an EBP and the viability of an EBP within an organizational context and alignment with its environment (Taxman & Belenko, 2012). This includes understanding the application of the EBP in the context of adoption, implementation, and sustention. Application refers to (a) the distillation of core concepts and components to a program, (b) the alignment or fit within an organization or community, and (c) the likelihood of addressing recognized barriers towards sustained implementation.

A related notion to knowledge utilization and application, as it pertains in the implementation sciences, is to understand how knowledge will evolve or be modified in a manner to fit within certain environmental contexts. Technology transfer, is “the process of introducing new technologies, programs, or practices into organizations” (Taxman & Belenko, 2012, p. 5). When considering technology transference across clinical, public health, and/or traditional school settings, a need exists to clarify and ensure mutual goals across stakeholders. Otherwise, the reason why (e.g., core concepts and components to a program) are at-risk for being diluted as practices are adapted to meet organization and other barriers towards implementation and sustention.

To date, little attention has been given to the more difficult issues related to utilization and application of best practices, including both the (a) feasibility of implementing key features to a practice with sufficient scientific evidence, and (b) alignment of policies and practices (Fixen et al., 2005; Taxman, Shepardson, & Byrne, 2004). In medicine, the National Institute of Health has raised calls for moving clinical findings to the field by emphasizing translational research (National Institute of Health, 2006). To promote and sustain change, an emphasis on EBP utilization and application requires significant attention to both the challenges of technology transference and its related innovation diffusion, including (a) developing organizational and staff capacity, (b) disseminating and translating EBP to practice, (c) sustaining staff skills and organizational leadership, and (d) monitoring fidelity and performance in tandem with outcome measures.

Finding What Works: Supporting the Multiple Needs of All Students.

To facilitate the implementation of three-tiered systems and the usage of EBP at every tier of prevention, school organizations are encouraged to build collaborative, data-informed structures for general and special educators to partner with other professionals to serve all students (Lane, Oakes, Cantwell, & Royer, 2016). Increasingly schools rely on systems oriented perspectives, such as three-tiered models of prevention, to strive towards the overarching goal of supporting all learners across increasingly more inclusive environments.

Three-tiered models of prevention. To address the multiple needs of all students, while simultaneously creating positive, safe, and orderly learning environments, many school organizations are adopting three-tiered models of prevention. Across three-tiered models, the following shared characteristics are shared:

> (1) evidence-based universal practices and programs for all students; (2) universal screening procedures to detect students who may need additional supports beyond the primary prevention program; (3) secondary and tertiary interventions and supports with increasing intensity in terms of duration and frequency, specialized instruction, and smaller teacher student ratios; (4) methods for monitoring the progress of students toward expected outcomes and benchmarks; and (5) procedures for assessing program implementation (Oakes, Lane, Jenkins, & Booker, 2013, p).

For example, one practice that has been deemed efficacious and effective in traditional school settings is team-based functional assessment-based interventions (FABI), a recommended Tier 3 practice to support a range of problem behaviors, including disruption, off-task behavior, non-compliance, and inappropriate social interactions (PBIS, 2017).

Functional assessment-based interventions. FABIs refer to interventions based on the reasons why challenging behavior occurs. Functional assessment refers to a category of procedures to formally assess environmental causes of problem behavior. These include descriptive procedures (i.e., behavior assessment), which includes informant assessment (e.g., interviews, rating scales) or direct observation (e.g., ABC assessment), as well as experimental procedures (i.e., functional analysis) including traditional and trial-based functional analysis. Whereas function-based interventions are interventions based on the reasons *why* challenging behavior occurs (e.g., function) based on results from the functional assessment.

Today, FABIs are mandated following certain disciplinary consequences for students receiving special education (Individuals with Disabilities Education Act; IDEA, 1997), as well as a Tier 3 support for any student identified as requiring more intensive supports. Since their inception in federal regulations (IDEA), FABI have been recognized as the "hallmark strategy for both assessment and intervention" (Scott & Alter, 2016, p. 80). Across the empirical body of literature examining functional approaches to assessment and intervention, both descriptive and experimental (e.g., functional analysis [FA], trial-based FA) methodologies have been found to be derive from a rigorous, high quality body of literature, demonstrating positive outcomes in students' behavior (Common, Lane, Pustejovsky, Johnson, & Johl, 2017; Gage, Lewis, & Stichter, 2012; Goh & Bambara, 2012; What Works Clearinghouse, 2017). Although Gage and colleagues (2012) found FABIs based on descriptive and experimental functional assessment procedures to both be effective, FABIs based on experimental methodologies were found to be more effective in reducing challenging behavior. These findings are consistent with a range of systemic reviews evaluating the methodological quality and omnibus effects of FABIs broadly to be effective in reducing problem behaviors (Common et al., 2017; Gage et al., 2012; Goh & Bambara, 2010; What Works Clearinghouse, 2016).

Since their initial introduction into school systems, FABIs have been implemented by professionals in a range of fields, including researchers, behavior analysts, behavior specialists, pre-service teachers, in-service teachers, and other educators (Chapter 3; Common et al., 2017; Lane, Oakes, & Cox, 2011). Under the *Professional and Ethical Compliance Code for Behavior Analysts*, the Behavior Analysts Certification Board (2014) specifies "when behavior analysts are developing a behavior-reduction program, they must first conduct a functional assessment" (p. 11). In addition to behavior analysts who support behavior change procedures, a range of professionals, including educators, psychologists and researchers design, implement, and evaluate FABIs.

Some have argued that "behavior analysts are the only educational and human services professionals that are explicitly trained on determining the function of the behavior before selecting an intervention. Their role in applying that knowledge of function within a multi-tiered PBIS system is critical." (Putnam & Kincaid, 2015, p 90). IDEA, the only federal legislation that specifies *when* functional behavior assessments (FBA) and behavior intervention plans (BIP) are to be implemented for students receiving special education services, does not indicate *whom* or *how* FBA/BIPs must be developed in accordance with the law (Collins & Zirkel, 2017). Under Title and Practice Acts, certain professions and their practices are protected and regulated by professional organizations or state licensing boards. The goals of certification and licensure are to protect consumers, the general public, the field, and practitioners and their professional identities. Professions protected by certifications are governed by professional organizations (e.g., BACB) and can restrict title (e.g., board certified behavior analysts) but not practices (e.g., ABA). Whereas, licensed-based professions are regulated by state licensing boards and can restrict title and practice under state power. Currently, behavior analysts are a certified profession across the United States, with some states further regulating the profession and practice under state licensure. Similarly, teaching can be either certified (e.g., by universities) or licensed (e.g., by state). As such, both preservice preparation programs across the two fields may have limited depth in their reach across clinical and classroom divides. Meaning some teacher preparation programs may offer limited training in behavior analysis while at the same time some behavior analysis certification programs may offer limited training to work within the educational context and culture of schools (Anderson, 2017).

Purpose

Special education, clinical psychology, and applied behavior analysis share many of the same historical roots (Benjamin, 2009). In recent decades, the fields of education and behavioral science have become increasingly more compartmentalized and specialized, such that the roles of researcher and practitioner are often filled by different individuals within professions and across disciplines (Critchfield & Reed, 2017). Some contend FABI as being both highly restrictive and privileged knowledge, and deemed practices that only certified or licensed behavior analysts should perform. The intent of this paper is to challenge such notions by offering evidence to suggest the field of education has always had an active role in the knowledge development, utilization, and application of FABI within the school context. First, we begin by introducing a conceptual model for understanding the implementation of EBPs regarding an organization's actions in moving from knowledge development to utilization and application described in transferring EBPs. Second, we explore the transportability of applied behavior analytic practices to various fields by offering two examples of how practices have been transported beyond the clinic and into court settings (contingency management). These examples are offered to illustrate the efforts of organizations to bring applied behavior analysis to scale. We conclude with a discussion of implications and future directions for school-based FABIs.

Transferring Evidence-based Practices

While the idea of using evidence-based practices continues to garner political and social support across human services fields–such as education, behavioral healthcare, and judicial courts–relatively little is known about how (a) practitioners evaluate the evidence-base when selecting practices (Weiss, Murphy-Graham, Petrosino, & Gandhi, 2008) and how (b) practices are fully brought to "scale" within pre-existing organizations, such as schools (Welsh, Sullivan, & Olds, 2010). When adopting a scientific-based protocol for real-world application, fit, alignment, and adaptation are major considerations in how feasible a new practice is to implement within an existing organizational culture (Portillo, Rudes, & Taxman, 2014; Schoenwald & Hoagwood, 2001; Taxman & Belenko, 2011). For example, fitting the principle of positive reinforcement (Cooper, Heron, & Heward, 2007), and more explicitly the EBP of contingency management utilized in addiction treatment to a traditionally more punitive-based organization, such as judicial settings might present certain challenges in transporting an EBP from one setting to another (Portillo et al., 2014). Such transformative practices often require substantial efforts to address staff needs in technology transfer, including the transportability of a practice from a high controlled setting to a more applied setting.

Transportability refers to an implementation science-based conceptual framework to consider how innovations (e.g., EBP) both align and adapt in the process of fitting within a given practice setting (Portillo et al., 2014). By using a lens of transportability, one can explore how the science-based evidence is molded into shape in operational settings (Portillo et al., 2014). In the following sections, an illustration is offered of how one type of judicial setting (problem-solving courts) adopted one applied behavior analytic practice – contingency management – and how court processes, attitudes of implementers, and key features of the intervention affected contingency management interventions. This is followed by an examination of what and how FABIs have been transported to traditional education settings.

Knowledge Development.

To promote the transportation of scientifically-validated practices, such as FABIs into actual practice, organizational leaders and other change agents have moved towards adopting an implementation science lens to facilitate organizational change (Eccles & Mittman, 2006; Fixsen, Naoom, Blasé, Friedman, & Walace, 2005; Odom, Duda, Kucharcyk, Cox, & Stabel, 2014). Although knowledge development and implementation are graduated processes, neither are linear process based on the questions (knowledge development) and organizational context (implementation). For example, knowledge development can be organized into categories of inquiry: (a) foundational research, (b) basic and exploratory research, (c) design and development research, and (d) effectiveness/outcomes research (Institute of Education Sciences [IES] & National Science Foundation [NSF], 2013). Based on the context of the questions, research can and should incorporate elements across these broad categories. Between knowledge development and utilization and application, systematic reviews and meta-analyses can be used to evaluate the methodological quality, efficacy, and effectiveness of a practice. Once a practice has been deemed effective and brought to scale, implementation processes are employed to facilitate introducing and contextualizing a practice to an organization.

Knowledge Utilization and Application

Across knowledge development and implementation, there are varying levels of control as practices move into utilization and application, from initial developer to full-scale implementation by a range of practitioners with varying degrees of developer collaboration. Fixsen et al. (2010) proposed a four-stage process to categorize implementation processes: (1) exploration, (2) installation, (3) initial implementation, and (4) full implementation. While adoption of a new practice may look straightforward, there are often barriers, such as alignment or fit within an organization or community, such as disengagement of past practices, that need to be considered (Portillo et al., 2014). More recently, Taxman and Belenko (2012) proposed the evidence-based interagency implementation model (EB-IIM) to understand actions organizations and change agents as they work towards installing, implementing, and sustaining EBPs into their organizational context. The EB-IIM model includes the following possible actions: "(1) knowledge development; (2) foundation building; (3) expectation setting; (4) alignment; (5) renovation; and (6) sustainability" (p. 13). The EB-IIM model, like knowledge development, is not a linear process as organizations may have different starting places for different EBP areas.

The first phases of the EB-IIM model, knowledge development and foundation building involve the actions an organization must take to familiarize the organization with the practice and its empirical support. First, organizations must promote knowledge development in their staff around core components of the practice, as well as the logic of EBP more broadly. This is followed by more concentrated training in building the foundational knowledge and technical aspects of the procedures. The third phase, expectation setting, involves actions an organization takes to couple each new practice with the rational and logic about the goals, and objectives; while clarifying values across the agency and stakeholders. The fourth phase, alignment, involves actions an organization takes to identify barriers, changes to procedures, and the impact of both barriers and changes with the goal of working towards desirable, achievable outcomes related to sustained implementation. The final stages, renovation and sustainability, when the organization works towards redesigning and refining processes that ensure the fit of the practice within the organization for sustained use over time.

Scaling up Applied Behavior Analysis

From an organizational perspective, innovative practices—such as the adoption of novel and new EBP—are less likely to be adopted and implemented unless the organizations are convinced that the practice has added value within the current organizational context (Taxman & Belenko, 2012). In the applied behavior and educational sciences, Gresham and Lopez (1996) first suggested implementer's social acceptability of a practice to be a probable predictor to the extent to which he or she implements the intervention according to plan. Which in turn, leads to higher rates of treatment integrity more likely to yield desirable interventions outcomes than interventions implemented with lower rates of integrity (Lane & Beebe-Frankenberger, 2004; Lane et al., 2009). The question of transportability, including issues pertaining to staff buy in, fidelity of intervention, and alignment of values to organization are seldom addressed in the identification, utilization, and application of an EBP. In the following section, illustrations are offered to how two applied behavior analytic practices were transported into actual practice in real-world settings.

Illustration One: Transporting Contingency Management

Contingency management. Contingency management (also referred to in the literature as behavioral contracts) is a practice with origins in applied behavior analytic clinical settings. Contingency management refers to an application of operant conditioning (Cooper et al., 2007). Specifically, antecedent stimuli achieve stimulus control of behavior, and desired behaviors are positively reinforced (for instance, with prizes, tokens, or monetary gains) to change behavior (or less often, undesired behaviors are punished). Contingency management has its origins in the science of ABA (Keller, 1868; McMichael & Corey, 1969). Contingency management is among the most empirically-supported strategies for increasing drug abstinence (e.g., Benishek et al., 2014; Prendergast, Podus, Finney, Greenwell, & Roll, 2006).

From clinic to court. In general, contingency management is not a common approach used in justice environments. Unlike mental health and educational settings (known to target changes in both desired and undesired behaviors) justice settings (known to target controlling behavior predominantly through surveillance and punishment; Foucault, 1975) introducing contingency management remains a formidable challenge. In court settings, contingency management shifts the role of court organizations from determine guilt-status and sentencing, to participating extensively in providing intensive supports (~12-18 months) via contracting with a focus on rehabilitative behavior changes related to the underlying problem behavior(s). In addition court, personal are encouraged to participate in all decisions related to case management and monitoring (e.g., use of rewards and sanctions to shape behavior), as well as impose therapeutic jurisprudence structure where the focus is on betterment of the individual (Portillo et al., 2014).

Despite the existence of strong empirical support across a range of disciplines that affirms the importance of incentives to behavior modifications, the concept of using reinforcement or rewards in justice settings (given the traditional emphasis on punishment or sanctions) faces some normative challenges (Portillo et al., 2014). For some professionals in mental health and justice settings, the idea of rewarding people for behaviors which are legally and societally expected runs counter to long-held social norms (Kirby, Benishek, Dugoush & Kerwin, 2006; Murphy, Rhodes, & Taxman, 2012). The transportability of scientific evidence into practice requires a focus on the organizational procedures and the contextual factors to promote the generalizability.

For example, in adopting contingency management to justice settings, the following situations proved challenging: (1) addressing the expectation that multiple behaviors will change simultaneously (e.g. drug use, criminal conduct, community service, etc.); (2) teaching scientific principles and EBPs to justice practitioners; and (3) translating behavioral approaches for justice workers who are more familiar with and accustomed to surveillance, punishment, security ideology, and sanctions-based systems (Portillo et al., 2014, p. 6). Portillo and colleagues (2014) explored the adoption of contingency management in six federal problem-solving courts (e.g., drug court, re-entry court). After the 34-month study, all six courts had successfully adopted and transported contingency management to their judicial settings with varying degrees of alignment.

Portillo and colleagues (2014) highlight both a lack of clarity about the policy and a lack of understanding regarding the purpose of using science-based principles and difficulty of transporting a scientific concept into practice. For example, four courts heavily adapted the practice to fit their current organizational (e.g., judicial) contexts, which in some instances directly misaligned with core contingency management components (Portillo et al., 2014).

Courts with high alignment were found to regularly discuss team member understanding and buy-in to core concepts, while courts with lower alignment continued their business-as-usual problem-solving court practices largely unchanged, with little discussion of the underlying concepts and reasons for contingency management.

Across sites, adaptations of contingency management focused on three contextual complications while transporting contingency management. First, judicial practitioners found it difficult to integrate new practices into already-robust work activities. Practitioners frequently highlighted the ways in which adhering to contingency management principles did not align with their current work environments (e.g., volume of other responsibilities). Second, judicial practitioners found it difficult to communicate with other participants about expectations for earning incentives. This challenge was in part associated with participants focusing simultaneously on several (often three or more) behaviors, while contingency management traditionally focuses on changing only one behavior at a time. Targeting multiple behaviors is typical for judicial problem-solving courts and a reasonable expectation for offenders. Yet for many, multiple target behavior complicated protocols, and judicial practitioners found it difficult to focus on, and keep track of, multiple goals. Finally, judicial practitioners were often questioned for using incentives to shape offender behavior by other constituencies (e.g., other judges, members of the US Attorney's office, the public). Problem-solving courts needed to learn to adopt contingency management while aligning with other stakeholder expectations. One partnership was formed with the local Federal Bar Association. While this added legitimacy to contingency management implementation, it also meant additional organization constrictions (Portillo et al., 2014). In the transportability of contingency management to court rooms, sites demonstrated a desire to implement contingency management while at the same time tailoring its principles to fit within their current organization context.

Illustration Two: Transporting Functional Assessment-based Interventions

Functional assessment-based interventions. Functional assessment-based interventions are interventions based on the reasons why challenging behavior occur. While functional approaches to assessment and intervention have their origins in applied behavior analysis (Cooper et al., 2007), FABIs have a long history in public education. Anderson, Rodriquez, and Campbell (2015) reviewed the literature examining the status of functional assessment across traditional school settings. Their search identified 233 articles, including 540 student participants published between 1981 to of which the earliest was published in 1981 (Weeks & Gaylord-Ross, 1981). There has been a substantial increase in rate of articles publication between 1991 and 2013. Notably, the first federal regulations to adopt any applied behavior analytic practice were first enacted within the Individuals with Disabilities Education Act (IDEA, 1997; Putnam & Kincaid, 2015), and again during the IDEA amendments of 2004 legislation, and the IDEA regulations of 2006. As amended in 2004, FBA and BIPs are required upon a disciplinary change in placement when the conduct in question is a manifestation of the student's disability (§ 1415[k][1][F][i]–[ii]). For instances when the conduct in question is not a manifestation of the student's disability, the requirements are conditional (i.e., "as appropriate") and the BIP is referred to more generally as "behavior intervention services and modifications" (§ 1415[k][1][D][ii]). Further, the 2004 amendments offered language for IEP teams to "consider the use of positive behavioral interventions, strategies, and supports, and other strategies to address that behavior" (§1414[d][3][B][i]) in situations in which the child's behavior impedes the child's learning or the learning of others.

To date, most student participants represented in the research literature have been overwhelmingly (a) male (68.3%), between the grades K (kindergarten) through 8th grade (ages 4-14; 79.6%), and (c) diagnosed or classified with either intellectual disability (31.7%) or autism spectrum disorder (31.6%). Other diagnoses or classifications represented in the literature also include psychiatric diagnoses (8.0%), EBD (10.5%), learning disabilities (1.9%), and other health impairments (1.4%). Across studies, 14.7% of participants had either no special education classification or diagnosis or it was not reported (0.3%). Anderson and colleagues (2015) identified differences in target behavior topographies displayed between students with autism or intellectual disabilities and all other students. Students with autism or intellectual disabilities were likely to receive FABI for self-injury, elopement, stereotypy, physical aggression, tantrums, and inappropriate vocalizations. Whereas all other students receiving FABI exhibited behaviors such as talking out of turn, defiance or verbal aggression, being off-task, being out of seat, and "problem behavior" (Anderson et al., 2015).

From clinic to classroom. Unlike contingency management, which was a novel and new practice for problem-solving courts, FABIs and ABA, in general, share a longstanding traditional of supporting students in traditional school settings. Iwata, Dorsey, Slifer, Bauman, & Richman's (1982/1994) seminal article for functional analysis examined operant methodology to assess functional relations between self-injury behaviors and specific environmental events in a clinical setting serving youth with developmental disabilities. Around the same time, Weeks and Gaylord-Ross (1981) also examined self-injurious behaviors, but in school settings with students with intellectual disability, by examining the links between socially self-injurious behavior and task difficulty, and positing aberrant behaviors as being a function of negative reinforcement contingencies (e.g., escape from work). These two studies are some of the earliest applications of functional approaches to assessment and intervention in applied settings.

Although it has been upwards of 35 years since the earliest functional assessment-based research in traditional school settings, and more than 20 years since IDEA first included FBA and BIP into their regulations, many schools continue to struggle to identify the function of problem behavior (i.e., FBA/FA) and to coordinate these results to guide the design and implementation of function-based interventions (Van Acker, Boreson, Gable, & Potterton, 2005). Despite FABI's concurrent development across clinical and traditional school settings, few studies have guided educators throughout the design, implementation, and evaluation of the FABI process (Chapter 3; Anderson et al., 2015). It is therefore not surprising that studies have found some professionals in traditional school settings (including classically trained educators and behavior analysts) to be inadequately prepared and often lacking the necessary skills to coordinate functional approaches to assessment and intervention (Anderson, 2017; Scott, Liaupsin, Nelson, & McIntyre, 2005; Van Acker et al., 2005).

To date, little is known about what level of expertise is needed to implement a given assessment or intervention (Anderson, 2017). The design, implementation, and evaluation of FABI requires a wide range of skillsets. The BACB specifies basic skills and underlying principles and knowledge, as well as applications of practice-oriented skills (BACB, 2017). Under federal/state laws or regulations, only qualified personnel meeting federal and/or state certification, licensing, registration, or other comparable requirements can provide either (a) special education and/or (b) related services, such as applied behavior analytic services and supports.

Despite these varying degrees of regulations and constraints in title and/or practice, a wide range of licensed and certification-regulated professions might entail job requirements requiring them to engage in the FABI process. Yet, not all pre-service education programs for professionals will include coursework on FABI processes. Only board-certified behavior analysis course sequences include direct instruction in functional approaches to assessment and intervention as part of their bylaws (BACB, 2017). Many BCBA programs, whether they are in a College of Liberal Arts and Sciences or School of Education, maintain a clinical focus during their programming, and few behavior analysis course sequences include specific coursework related to working within traditional school settings (Anderson, 2017). While some pre-service educators receive training in ABA and functional assessment-based interventions (Lane et al., 2011) and some behavior analysts receive training in school-based service delivery (Anderson, 2017), inevitably, others do not. Further, the BACB experience standards for supervision of preservice behavior analysts specifies supervision to include the following: (a) development of performance expectations; (b) observation and performance feedback; (c) modeling; (c) guiding case conceptualization, problem solving, and decision making; (d) review of written materials, (e) oversight and evaluation of behavior service delivery, and (f) ongoing evaluation (BACB, 2017). However, experience standards do not stipulate expectations that supervision experiences align with supervisees' professional objectives. That is, supervisees working towards professional responsibilities in school settings are not required to ever be supervised within school settings as part of their pre-certification. As such, it is critical that professionals act responsibly and within their own competencies and skillset regarding underlying principles and applications of practice.

Aligning and renovating FABI for use in schools. An organization's alignment of an EBP to its contextual fit are critical to support all stakeholders to work collaboratively towards a common goal and address the barriers to full implementation. Some obstacles related to implementing FABIs include (a) functional assessments take too much time, (b) functional assessments are too complex, (c) experimental approaches (i.e., function analysis; FA) are too risky for the client and person conducting the functional assessment, (d) functional assessments are difficult to sell to constituents, (e) FA examining dangerous behavior is unethical, (f) not all behaviors—such as low-rate or covert behaviors, behaviors with multiple topographies or functions, or behaviors with constantly changing reinforcers—are conducive across assessment procedures (Hanley, 2012).

To date, several innovations have been adapted and transported to facilitate the use of FABI into schools (Umbreit & Ferro, 2014). Some of these procedures include advances in descriptive functional assessment, including developments of scatterplot assessment (Touchette, McDonald, & Langer, 1985), A-B-C assessment (Cooper et al., 2007), behavioral interviews, behavior rating scales, checklists, and questionnaires (Cooper et al., 2007; Dunlap et al., 1993; Kern, Dunlap, Clarke, & Childs, 1994), and manualized procedures to coordinate the FBA and BIP process (Umbreit, Ferro, Liaupsin, & Lane, 2007).

Sigafoos and Saggers (1995) developed an alternative to experimental functional assessment (e.g., FA). In traditional FA procedures, various experimental and control conditions each lasting upwards to 10 min in length per condition, are tested in highly controlled environments outside of the actual environment to directly observe and measure one or more target behaviors relation to environmental events (Iwata & Dozier, 2008). Whereas, trial-based functional analysis (TBFA; Sigafoos & Saggers, 1995) test similar conditions across multiple trials lasting 1–2 min in length and conducted in the natural environment (e.g., the classroom).

Today TBFA procedures have been taught and successfully implemented by range of educators including special education and Head Start teachers (Flynn & Lo, 2015; Kunnavatana et al. 2013a; Kunnavatana et al. 2013b; Pence, St. Peter, & Gules, 2014; Rispoli et al., 2014; Rispoli et al., 2016).

Umbreit and colleagues (2007) developed a systematic approach to support educators' design, implementation, and evaluation of FABI in authentic educational settings. The Umbreit model includes unique features to assist practitioners in the design, implementation, and evaluation of FABIs in a range of settings. These tools include *Function Matrix, Function-Based Intervention Decision Model*, and *Antecedent-Reinforcement-Extinction (A-R-E) Components* (for a description, see Chapter 1). Common and colleagues (2017) evaluated the Umbreit model, and found the literature to be overall methodologically rigorous and leading to positive student outcomes, although insufficient evidence was available to classify the practice was an evidence-based practice following Council for Exceptional Children's (2014) standards.

Lloyd and colleagues have made recent advances in functional approaches to assessment and intervention in the classroom, including measuring contingencies (Staubitz & Lloyd, 2016) functional analysis (Lloyd, Weaver, Staubitz, 2017), and integrating psychotropic and intensive behavior interventions in schools (Lloyd, Torelli, & Symons, 2016). Contingencies are defined quantitatively as the difference between two probabilities and measures which describe interactions between behavior and changes in the environment (Martens, DiGennaro, Reed, Szczech, & Rosenthal, 2008). Like A-B-C recording, contingency data operationally define a target behavior, with the addition of also defining relevant consequence likely to reinforce the target behavior. Data are collected and each contingency is calculated as a probability and plotted on a contingency graph (Staubitz & Lloyd, 2016). Lloyd and colleagues (2016) recently reviewed behavior analytic approaches to intensive intervention models packaged with psychotropic medications and propose a framework for integrating the medical and behavior analytic treatment models in schools. Having a range of functional assessment procedures, including original methodologies and more recent innovations, offer educators and behavior analysts a robust set of technologies to facilitate functional approaches to assessment and intervention for classroom organizations.

Sustaining FABI for use in schools. To refine and improve school's efforts in maximizing their support of all learners, school organizations must continue to facilitate—to the maximum extent possible—the available expertise within the building and the district through professional development offerings and time for educators and related service providers to collaborate meaningfully (Lane et al., 2016). To this end, there is a need to produce in educators the full set of skills to design, implement, and evaluate FABIs (and related, principles of ABA) to facilitate federal mandates and technical assistance recommendations to support students with the most intensive needs with FABI. Further, there is need to produce certified and licensed behavior analysis who work in schools, with not only the skills outlined by the BACB (2017) but also with the skills needed to serve as collaborates within the education community by better understanding school organization, culture, and context (Anderson, 2017).

To this end, the fields of applied behavior analysis and education, are encouraged to move forward with a shared goal of ensuring professionals partaking in the design, implementation, and evaluation of FABI have the basic skills and knowledge in the concepts, strategies, science, philosophy, and ethics pertaining to FABI and more specifically the principles of behavior. Applications of practice-oriented skills necessary to design, implement, and evaluate FABI include a broad-reaching repertoire of professional behaviors in ethics, behavioral assessment, behavior-change procedures, selecting and implementing interventions, and personnel supervision and management (BACB, 2017). For any behavior-change procedure, practitioners and researchers should behave ethically and in accordance with (a) acting responsibly as a professional, (b) acting responsibly to the clients, (c) assessing behavior, and (d) design, implementing, and evaluating behavior-change programs (BACB, 2017). For example, Ferro, Umbreit, and Liaupsin (2010) developed an ethics checklist to support educators perform FABI following a systematic approach developed by Umbreit and colleagues (2007). Ferro et al. (2010) offer 15 considerations (e.g., is the intervention warranted, did the intervention follow from the functional behavior assessment, and do the procedures stigmatize the student socially) for practitioners to ask and reflect on throughout their efforts coordinating the functional assessment and its subsequent intervention.

The BACB (2017) specifies nine competences necessary to properly conduct behavior assessment: (a) review available records and data (e.g., educational, medical, historical) at the outset of the case; (b) determine the need for behavior-analytic services; (c) identify and prioritize socially-significant behavior-change goals; (d) conduct assessments of relevant skill strengths and deficits; (e) conduct preference assessments; (f) describe the common functions of problem behavior; (g) conduct a descriptive assessment of problem behavior; (h) conduct a functional analysis of problem behavior; and (i) interpret functional assessment data. Umbreit et al., (2007) developed a systematic process that coordinates the functional assessment with behavior-change procedures, and with selecting and implementing interventions. Further, the BACB (2017) specifies 22 competencies for behavior-change procedures and nine competencies related to selecting and implementing interventions. Setting clear professional competencies and ethical standards (BACB, 2017), and creating and sustaining innovations of practices—such as those prompting the transportability of FABI into classrooms (Umbreit et al., 2007)—have facilitated the fields moving towards a shared vision and goal.

One challenge associated with certification and licensure is the restrictive capacity in which they regulate knowledge and practice of a field that has applications across many disciplines, settings, and populations (Shook, 1993). Implementation of FABIs are distinct procedures—that are observable, measurable, and repeatable—and often produce permanent products. There are a range of possibilities in coordinating responsibilities in conducting functional approaches to assessment and intervention that can be shared across classroom teachers, paraprofessionals, administrators, school psychologists and related service providers, including behavior analysts.

In the transportability of FABI into traditional education settings, emphasis must be placed on how educators and behavior analysts alike operate within school organizations in comparison to clinical settings, including access to adequate resources, such as rigorous training and adequate time for collaboration (or supervision) among and between professionals. For many classroom teachers navigating competing responsibilities to school-wide, class-wide, and student-centered supports, it can be challenging to manage the rapid demands of data collection and intervention decision-making that are necessary to implement functional assessment-based interventions with sufficient reliability and validity (Anderson, 2017). Implementers may vary in the degree to which they are sufficiently skilled and or willing to adapt the key features of implementation, which in turn may lead to decreased fidelity and/or treatment intensity, as well as having a negative impact on the reliability and/or fidelity of the intervention across the design implementation, and evaluation of functional approaches to assessment and intervention. In turn, behavior analysts can apply their skillset to help empower school personnel to design, implement, and evaluate FABI through forming partnerships as collaborators who share the same ultimate goal.

Discussion

In the applied world, there are two branches of thought concerning ABA: there are those who conjecture that only board-certified behavior analysts have the agency of conducting functional assessments and designing behavior intervention plans while others believe that both board-certified behavior analysts and other trained professionals can design, implement, and evaluate FABIs. While the developmental trajectory of FABI into schools was, and is not a linear path, nor was it a practice developed in isolation within clinical settings and transferred to less restrictive classroom settings. Rather, FABI draws from a rich interdisciplinary history including behaviorism, experimental psychology, and ABA, psychiatric and pediatric care, and education (e.g., Aylonn & Michael, 1959; Carr, 1977; Dunlap, Kern-Dunlap Clarke, & Robbins, 1991; Iwata et al., 1982/1994; Lennox & Miltenberger, 1989; Lovass, Freita, Gold, & Kassorla, 1965; Skinner, 1953, 1957; Weeks & Gaylord-Ross, 1981). Since 1981 (the earliest function-based school-based inquiry; Weeks & Gaylord-Ross, 1981), functional approaches to assessment and intervention research has accumulated a robust and rigorous body of literature further developing, designing, and demonstrating its efficacy in both clinical and educational settings (Common et al., 2017; Gage et al., 2012; Hanley, Iwata, & McCord,2003). During this time, FABIs have moved out of highly-controlled settings in clinics and classrooms (e.g., pediatric hospitals, self-contained classrooms) and are now widely used in a variety of authentic residential, community, and educational settings (e.g., general education classroom; Gann, Ferro, & Umbreit, 2013). This literature has predominantly employed single-case research designs to demonstrate the efficacy of new functional approaches to assessment and interventions and/or extend these practices to a wider range of settings, intervention agents, and consumers of treatment. Yet little research has examined the implementation and sustainability aspects of functional-assessment-based interventions in school settings including the transportability of a predominantly clinically-oriented practice to a wider range of organizational actors within authentic educational settings – such as classrooms supporting students at risk within three-tiered systems.

To empower educators with the agency to acquire, demonstrate, and gain fluency in FABI, it is essential that pre-service education and pre-service behavior analyst training programs include course content that covers both ABA and working within schoolwide systems. The design, implementation, and evaluation of FABI is challenging, and clearly requires practice-based, continuum-based, high-quality professional development that includes features such as coaching, training, and ongoing collaboration across stakeholders (Lane et al., 2015; Oakes et al., 2017). Educators will need ongoing professional learning, and opportunities to collaborate with researchers and behavior analysts alike that balance direct instruction with opportunities to apply and gain fluency in newly acquired skills. Lane and colleagues (Common et al. 2017; Lane et al., 2015, Oakes et al., 2017) developed a practice-based professional learning series designed to support school's development of team-based approaches to FABI. Concepts and strategies taught and applied during the training series are grounded in applied behavior analysis and teacher educators design, implement and evaluate FABIs using the Umbreit model.

State and federal legislation and regulations, as well as professional organization bylaws, who are charged with protecting consumers, the public, practicing professionals and the field must maintain their primary duties while maintaining flexibility to facilitate to the maximum extent possible the fit and transportability of FABI into traditional school settings, across a range of school contexts. As such it is essential for these different fields to work toward a shared goal of extending the knowledge base, while ultimately protecting the very individuals, organizations, institutions, and disciplines they are charged to serve.

Although FABI are mandated in IDEA, and a recommended Tier 3 practice within three-tiered models of prevention (Ci3T, n.d.; PBIS, n.d.), concerns have been raised by the research and behavior analysis community regarding (a) the extent to which non-certified behavior analysts can and should participate in the design, implementation, or evaluation of FABI; and (b) the extent to which descriptive approaches to functional assessment (i.e., functional behavior assessment) are reliable and valid in comparison to experimental approaches to functional assessment (i.e., functional analysis). Despite differences in basic procedures for functional assessment, Gage et al. (2012) found in a systematic review and meta-analysis that individualized interventions developed based on the results of functional assessment were significantly effective, regardless of assessment procedures (although experimental functional analysis led to greater gains in desired student outcomes in comparison to descriptive functional behavior assessment). Similar research is needed to examine differences in student outcomes of FABI between board-certified and adequately-trained traditional school personnel.

To facilitate new and existing expertise around functional approaches to assessment and intervention, as well as develop new knowledge in a wider range of school personnel, school organizations should provide professional training to balance "(a) the need for knowledge of an individual student, and (b) the necessity for professionals rained in the FBA-BIP process, and (c) the challenges that can be related to personnel availability" (Collins & Zirkel, 2017, p. 6). Within educational organizations, extensive research and practice have demonstrated that FABI should utilize a team-based approach, including the classroom teacher with team member(s) knowledgeable in functional approaches to assessment and interventions, and more broadly ABA (Collins & Zirkel, 2017; Gable, Park, & Scott, 2014; Lane et al., 2015; Scott, Anderson, & Spaulding, 2008; Van Acker et al., 2005). Further, such teams should be individualized for each student, rather than having school- or district-based teams across all students (Collins & Zirkel, 2017).

Future Issues and Directions

A flourishing body of research supports the use of FABI for students with or at-risk for behavioral challenges (Common et al., 2017; Gage et al., 2012; WWC, 2016). However, there are gaps and inconsistencies in the research, legal and professional requirements, and recommendations for both its procedural and substantive dimensions of practice (Collins & Zirkel, 2017). To further facilitate the development, implementation, and sustainability of FABI in traditional education, new knowledge is needed, as well as clarity within and about state and federal legislation, regulations, and professional organization bylaws governing certified professions.

In examining the transportability of FABI from the fields of ABA to education, issues around transportability are less about introducing new practices and more about facilitating implementation, and sustainability across the range of school personnel to promote team-based approaches within school systems. Rather than debating who can and cannot design, implement, and evaluate FABI in school settings, new research is needed to address key questions around scaling up applied behavior analytic principles and knowledge across a range of school-based personnel. Moving beyond basic EBP-framed questions—“Does this work?”, “How well does this work?”, “Under what conditions does this work?”, and “Is this an evidence-based practice?”—addition questions are needed. These questions include: “How does this practice fit into a school organization’s context?”, “What school personnel are and can be trained in this practice”, “How innovations and integrity issues related to procedures, practices, are and principles monitored and sustained?”

In transporting the principles and application of FABI to pre-service and in-service educators, more research is needed demonstrating desired outcomes of students in relation to what professional learning opportunities are available to educators (Chapter 2). The application of univariate and multivariate statistics, as well as more advanced quantitative modeling (e.g., hierarchical linear modeling and structural equation modeling) will help us better understand the acquisition and application of FABI in educators and its relation to desired outcomes at the levels of intervention agent and consumer of treatment alike (Chapter 3).

In addition to examining shifts in knowledge related to essential components of FABI (Chapter 3, Christensen, Renshaw, Caldarella, & Young, 2012; Lane et al., 2015, Oakes et al., 2017) there is also a need to examine the extent to which educators can design, implement, and evaluate functional-assessment-based interventions with fidelity (Chapter 3-4; Flynn & Lo, 2015). Single-case design and randomized-control trials employing univariate and multivariate procedures are need to better understand the relations between professional learning, social validity, treatment integrity, and desired outcomes – at both the educator (e.g., intervention agent) and student (e.g., consumer of treatment) level.

Consultation and collaboration among behavior analysts and educators alike would benefit from data-based decision-making to transport new knowledge gleaned from professional learning into actual practice (Chapter 2). Third-party behavior analysts might be called in to support a student in a school setting due to limited capacity within the district and/or in response to a parent's request for an independent education evaluation. In either case, Social validity from the perspective of the implementing classroom teacher, as a pre-measure might facilitate the successful implementation of a BIP in a classroom designed by a consulting behavior analysis, who might have limited knowledge of what is feasible for a classroom setting. Research has found that implementing intervention agent's social validity prior to implementation is a significant predictor in how well they implement the intervention (Gresham & Lopez, 1996; Lane et al., 2009). Behavior analysts can further facilitate implementation by monitoring teacher's behavior towards implementation. Highly-trained experts in behavior analytic practices and experimental design can monitor school-based teams' fidelity in their work supporting students, while simultaneously monitoring teacher-level behaviors using a collaborative coaching framework. For example, Wood, Umbreit, Liaupsin, and Gresham (2007) trained a classroom teacher to implement a functional assessment-based intervention. In addition to monitoring student outcomes, the teacher's fidelity was measured to analyze the effects of the intervention on student performance in tandem with teacher's fidelity.

Further research is needed to examine the transportability of FABIs using qualitative and mixed-methodology to better understand the processes in which FABIs are brought to scale using a team-based approach among traditional school personnel. Specifically, research examining how educators adopt new practices and disengage with previous practices that are not aligned with a PBIS guided by function (e.g., punishment) and are non-data informed decision making (e.g., trial-and error intervention selection) is needed. The transportability framework introduced in this chapter can more broadly explore how school systems process, attitudes of implementers, and key features of FABI were affected within school systems to facilitate best practices in research, practice, and advocacy around FABI in school settings.

Finally, future research is needed to examine the role of functional assessment and intervention to guide three-tiered efforts across the tiers. PBIS has led to the successful adoption of FABIs as a Tier 3 offering to support students with and at-risk for EBD. Rather than waiting for certain disciplinary consequences, and supporting only those students identified and receiving functional assessment-based interventions, FABI as a Tier 3 support allows schools to respond early in a child's career and/or early in the development of a problem behavior. Future research is needed to examine the feasibility and utility to similarly inform Tier 2 intervention selection based on function, as well as Tier 1 efforts in identifying incentives to be used as part of a school's efforts to offer reinforcers to students to help them access and/or avoid certain stimuli.

Summary

This paper explored the contextual fit of FABI into traditional school settings, by examining its evidence base, as well as innovations and other developments that have facilitated successful adoption of FABI by typical intervention agents, including educators and other school personnel as part of team-based FABI, as well as certified behavior analysis. A transportability framework, derived from the implementation sciences, was used to examine the shared trajectory of FABI as an EBP practice across clinical and educational settings. Despite differences in legal regulations and professional recommendations regarding functional approaches to assessment and intervention, there is a growing body of literature operationalizing FABI as observable, measurable, and ultimately a repertoire of shapeable behaviors that can be taught to and implemented by a range of professionals in school settings.

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Chapter 5:

Discussion

As we continue forward in supporting functional approaches to assessment and intervention in more naturalistic settings, the goals of research and practice are aligning to meaningfully contributions to the field, impacting the implementation of effective assessments, interventions, practices—and ultimately promoting socially meaningful changes in student outcomes both within and beyond the classroom walls. This dissertation concludes with a final synthesis regarding the current status of functional assessment-based interventions (FABI) in schools. We begin this synthesis with a brief introduction of the current status, role, and need for FABI in schools, and discusses challenges related to implementation. Second we offer a brief summary of findings across the three major chapters, and conclude with a brief discussion on major implications and considers for future research and practice.

FABI in Schools

Special education services less than 1% of the student population for emotional disturbance (ED), although 12% to 20% of students demonstrate internalizing and/or externalizing patterns of behavior indicative of having an emotional or behavioral disorder (EBD) at moderate/severe (12%) to mild levels respectively (20%; Forness, Freeman, Paparella, Kauffman, & Walker, 2012). Historically, teacher preparation programs trained general education teachers in academics, with little to no emphasis in students' emotional and behavioral needs (e.g., social skills instruction and conflict resolution; Lane, 2007). Students who required additional supports (e.g., student-level considerations) were often supported outside of the general education classroom context, often by being referred, tested, and placed in special education settings (Shinn, 1986). In recent years, schools have shifted towards adopting systems-level preventative models, with the goal of referring, consulting, and intervening in increasingly more inclusive contexts (Horner & Sugai, 2015). This can be accomplished through the implementation of three-tiered models of support including primary, secondary, and tertiary supports.

Primary prevention (Tier 1) is for all students, and aims to prevent academic, behavioral and social challenge from occurring. Graduated supports are additionally offered with increasing levels of intensity for those students identified as needing more support. This additional support includes, (a) secondary prevention (Tier 2) efforts which focus on reversing existing challenges; as well as (b) tertiary preventions (Tier 3) which focuses on reducing existing challenges (Walker, Severson, & Feil, 2014). Functional assessment based interventions (FABI; Umbreit, Ferro, Liaupsin, & Lane, 2007) are one example of a Tier 3 support.

Functional assessment-based interventions are supports for students with the most intensive intervention needs based on the reasons why challenging behavior occur. (Umbreit et al., 2007). FABIs employ behavior analytic procedures to identify functional relation(s) between one or more behaviors and environmental event(s), which then are used to guide intervention development (Kates-McElrath, Agnew, Axelrod, & Bloh, 2007). There are two types of functional assessment methods, which can be classified as: (a) descriptive (e.g., direct assessment, indirect assessment), and (b) experimental (e.g., functional analysis; Neef & Peterson, 2007). What Works Clearinghouse (WWC, 2016) recently reported FABIs as being associated with potentially positive effects on increasing school engagement and potentially positive effects on decreasing problem behavior. In a recent meta-analysis, Gage, Lewis, and Stichter (2012) found behavior intervention plans (BIP) based on functional assessment methodologies were significant regardless of functional assessment method, with some evidence to suggests FABIs derived from experimental methods to be more effective for students with or at-risk for EBD.

Functional assessment-based interventions are in addition to being a recommended Tier 3 Support (PBIS, n.d.), also mandated following certain disciplinary consequences for students receiving special education (Individuals with Disabilities Education Act; IDEA, 2004). For example, a functional assessment and resulting BIP is required following a disciplinary change in placement when the conduct in question is manifestation of the student's disability

(§ 1415[k][1][F][i]–[ii]). When the conduct in question is not a manifestation, FABIs are conditional and only “as appropriate” (§ 1415[k][1][D][ii]).

The Office of Special Education Programs’ Technical Assistance Center on Positive Behavioral Interventions and Supports (PBIS; n.d.) has also recommended functional approaches to assessment and intervention as a viable Tier 3 support for *any* student identified with this level of intervention needs. These recommendations are well-aligned with IDEA (2004), which does not require FABIs for students whose behavior is not a direct manifestation of their disability, but instead recommends more broadly “behavior intervention services and modifications” (§ 1415[k][1][D][ii]). Most recently, in a U.S. Department of Education Dear Colleague Letter (2016), it was stipulated under Section 504 of the Rehabilitation Act of 1973, that seclusion and constraints in schools without another plan in place is classified as a human rights issue.

Following these early adoptions, some in the field have argued FABI, as a school-based practice, has not yet been demonstrated by a strong enough literature base to warrant such wide scale calls promoting its implementation across school contexts. Specifically, research to practice gaps have been documented regarding a lack of (a) research supporting the use of FABI in less restrictive and more authentic education settings (Fox, Conroy, & Heckman, 1998; Gresham, 2004; Kern, Hilt, & Gresham, 2004; Quinn et al., 2001), (b) socially valid procedures for use by typical school personnel (Conroy, Fox, Crain, Jenkins, & Belcher, 1996; Scott & Nelson, 1999), (c) core knowledge demonstrated by school personnel to coordinate functional assessment processes to guide intervention design and subsequent implementation (Stichter, Shellady, Sealander, & Eigenberger, 2000), and (d) knowledge in developing preservice and in-service training in FABI procedures (Shellady & Stichter, 1999).

These barriers towards implementation are not surprising, given the levels of specialized skills and behaviors needed to coordinate the process of designing, implementing, and evaluating FABI (Baer, Wolf, & Risely, BACB, n.d.a; Behavior Analysis Certification Board; BACB, 2017). For example, the BACB, a professional organization for practitioners of behavior analysis providing services, currently offers credentials at four levels. Each credentials levels has specified requirements for obtaining certification including (a) educational degree and accredited coursework, (b) supervision, and (c) continuing education units (BACB, n.d.b).

One challenge associated with certifying or licensure constraints around behavior analytic services is the restrictive capacity in which licensure and certification can regulate knowledge and practice of a field that has applications across many disciplines, settings, and populations (Shook, 1993). While the field of behavior science has both certification and licensures governing such practices, education—which is required within its capacity to support some students with FABI—does not. Although IDEA originally indicated training for school personnel involved in functional assessment as necessary, it did not specify the minimal skill set needed to implement function-based assessment nor its intervention procedures (Ervin, Ehrhardt, & Poling, 2001). These challenges can lead to fragmented and splintered skillsets across professionals, with some being highly skilled in knowledge and practice but not in context (e.g., intervention setting; organizational culture; Taxman & Belenko, 2012). Whereas some board certified behavior analysts are highly skilled in behavior analytic principles and some school personnel are highly trained in school organizations, either type of professional can lack the training, expertise, and resources need to implement FABIs effectively within school settings (Kates-McElrath et al., 2007; Van Acker, Boreson, Gable, & Potterton, 2005).

Since its initial reception under federal regulations (IDEA, 1997), many of these early concerns have prompted and led to high quality, methodologically rigorous research, supporting its use across a range of less restrictive, authentic educational settings (Common, Lane, Pustejovsky, Johnson, & Johl, 2017). Across these studies, findings related to social validity suggest the perceptions of school personnel and the students they support to have found FABIs to be socially valid (e.g., Codding, Feinberg, Dunn, & Pace, 2005, Germer et al., 2011). To date a number of studies have also examined professional learning opportunities to train preservice and in-service educators, demonstrating positive outcomes across trainees and the students they support (see Chapter 2-3; McCahill, Healy, Lydon, & Ramey, 2014).

In contrast to knowing when to implement FABI (e.g., IDEA [2004], PBIS [n.d.]), and knowing what works (WWC, 2016), the scientific nor professional communities have yet come to consensus on what type of professionals should be involved FABI implementation, nor the type training that is necessitated in order to effectively design, implement, and evaluate FABIs (Collins & Zirkel, 2017). In general, FABIs require the successful implementation of three coordinated processes: (a) conducting the functional assessment, (b) developing the BIP, and (c) evaluating the BIP. Umbreit et al. (2007) developed one systematic approach to support educators in conducting functional assessments by identifying maintaining function(s) of target behaviors and designing BIPs which are directly linked to the results of the functional assessment (for details, see Chapter 1). The Umbreit model is a feasible and manualized model that coordinates FABI processes and has been demonstrated efficacious with limited university support (Lane, Weisenbach, Little, Phillips, & Wehby, 2006). Christensen and colleagues (Christensen, Renshaw, Caldarella, & Young, 2012; Renshaw, Christensen, Marchant, & Anderson, 2008) and Lane and colleagues (Chapter 3, Lane, Barton-Arwood, Spencer, & Kalberg, 2007; Lane et al., 2015, Oakes et al., 2017) separately developed professional learnings to empower general educators as well as school-based teams to learn how to design, implement, and evaluate FABIs while supporting students exhibiting challenging behavior. Across studies, desirable shifts in students' performance have also been observed (for review, see Chapter 2).

This dissertation followed recommendations which promote team-based approaches to FABIs (Collins & Zirkel, 2017; Scott et al. 2005). Scott, Anderson, and Spaulding (2008) recommend for example, FABI teams should be individualized for each student, rather than having a school-based or district team, and include a professional knowledgeable of the functional assessment and BIP process (e.g., behavior specialist, certified behavior analysts), an administrator, academic specialist, school personnel familiar with student (e.g., classroom teacher), parents, and as appropriate, the student.

Across chapters, we offer (a) a systematic review examining the extent literature on training in-service educators and other school-site personnel (Chapter 2), (b) a study examining pre and post training outcomes of school site teams who were randomly assigned to either university led or state technical assistance led professional learning on FABIs (Chapter 3), and (c) a conceptual paper examining how schools have and are adopting and implementing FABI (Chapter 4). This chapter summarizes salient findings across chapters and offers a brief discussion pertaining to generalization and implications regarding recommendations for future research and practice.

Summary of Findings

Functional Approaches to Assessment and Intervention: A Systematic Review of Professional Learning Opportunities for Educators

In Chapter 2, we offer a systematic review surveying the literature of professional learnings targeting ways of supporting in-service educators to learn how to design, implement, and evaluate FABIs. This review synthesized 25 studies to map the literature on (a) who has received professional learnings related to FABI and who did the training, (b) how has the professional learning been investigated experimentally, and (c) what is the nature of the professional learning experiences. In answering the *who* question, educators attending the training as trainers represented a range of school-related personnel roles including: general education teachers, special education teachers, school psychologists, teacher assistants, counselors, learning specialists, and other school staff. Trainees' education ranged from high school diploma to doctoral degree, with various levels of previous learning in applied behavior analysis and classroom management. Trainers, coaches, and consultants supporting professional learning efforts were predominately from university settings, with some state trainers, as well as district or school staff. To answer the *how* question, professional learnings related to FABI vastly employed single-case research methodologies (n = 17; 68%), followed by pre and post test designs (n = 5; 24%), post test only design (n = 1; .04%), and finally 3-by-3 split plot analysis with factors (n = 1; .04%) to examine the professional learning opportunity as the independent variable. Dependent variables ranged from procedural fidelity/accuracy to measuring perceived/actual knowledge. To answer the *what* question, the majority of studies (n = 13) taught experimental approaches to functional assessment to staff, but the majority of these trainings focusing on either traditional or trial-based functional analysis did not also include training on linking functional assessment results to designing, implementing, or evaluating the behavior intervention plan (BIP = 2). Nine studies taught descriptive functional assessment methodologies, of which eight studies also focused on linking functional assessment results to designing, implementing, or evaluating the BIP. Finally, four studies focused on either designing implementing, or evaluating the BIP with little to no attention on the functional assessment process. We concluded this chapter with recommendations to the field to (a) coordinate professional learning opportunities that incorporate designing BIP explicitly linked to the results of the functional assessment process, and (b) include trainee-level and student-level professional learning outcome measures. Specifically, future professional development research should clearly operationally define their theory of changing, including (a) how professional learning offerings lead to changes to trainees and (b) how resulting changes in trainees lead to desired outcomes in students (U.S. Department of Education, Institute of Education Science, 2014).

Building Site-level Capacity for Functional Assessment-Based Interventions: Outcomes of a Professional Learning Series

In Chapter 3, we examined the effectiveness of practice based professional learning series designed to teach school site teams to design, implement, and evaluate FABIs (as developed by Umbreit et al., 2007) while supporting an actual student through applied leaning activities. Specifically, the extent to which this practice based professional learning series was implemented across university and state trainers was also examined by comparing (a) the procedural integrity of the learning series (b) trainees learning outcomes and team progression through applied activities, and (c) student outcomes. Overall, this practice based professional learning series was implemented with high levels of fidelity across university and state trainers. Across cohorts, which were led by either university or state trainers, trainees made gains in their actual and perceived knowledge, perceived confidence, and perceived usefulness across FABI concepts and strategies during the training series. Slight differences were observed between cohorts when comparing university-led and state trainer-led trainings as well as between the two state trainer-led cohorts. Results from this professional learning series offer additional evidence supporting the use of team-based approaches to FABI by authentic educational personnel (Scott et al., 2008).

Collectively, these findings suggest some differences across cohorts, but these patterns were inconsistent. Additionally, teams progressed through the five step systematic process used to coordinate the Umbreit model (2007) with the majority of teams completing 80% or more of Step 1 and Step 2. Whereas only 47% of teams completed 80% or more of Step 3, 42% for Step 4, and 41% for Step 5. Of the teams who submitted materials (i.e., graphs) to allow visual inspection of student-level data, nine out of 44 teams (20.45%) demonstrated a functional relation between the introduction of the BIP and changes in student performance. These findings are consistent with those from other research teams who have trained educators to successfully implement the Umbreit model and support students with challenging behavior (Christensen et al., 2012; Lane et al., 2015, Oakes et al., 2017). For example, across studies, this study found similar patterns between previous studies led by Lane et al., (2015) and Oakes et al. (2017) demonstrating participants made substantial gains across all knowledge constructs, as measured from start to finish across professional learning series. One noteworthy difference in our current study, participants scored highest in actual knowledge across time points. These findings suggest teams may have underestimated their perceived knowledge, illuminating the importance of measuring both perceived and actual knowledge in future professional development research. We concluded this chapter with recommendations to the field to (a) examine the validity of criterion-related constructs such as knowledge when examining trainees' outcomes related to FABI concepts and strategies (b) examine the team meetings and coaching processes occurring between training days, as well as the ongoing FABI team processes occurring post training to better understand how teams gain knowledge and fluency over time. Limitations related to sample sizes across cohorts, percentage of missingness and statistical inferences, as well as coding procedures evaluating student outcomes were also discussed.

Embedding Functional Assessment-based Interventions into Schools: The Technological Transference of Evidence-based Practices

In chapter 4, we offered a conceptual frame derived from the implementation sciences to examine how schools have adopted functional approaches to assessment and intervention as an evidence-based practice whose origins are prominently derived from clinical models. It was posited that functional approaches to assessment and intervention did not solely develop in isolated clinical context, but rather share its ontogenesis across clinical and educational settings in both research and practice. To support the implementation, sustainability, and ultimately context fit of scientifically-validated and professional recommended practices, such as FABIs into actual practice, we recommend the fields of education and applied behavior analysis work in tandem to maximally equip stakeholders to design, implement, and evaluate FABIs as part of regular school practices, which can be facilitated by regular school personnel, using a team-based approach. Moving from knowledge development in highly controlled research-based settings to utilization in more authentic and applied settings, such as clinical and school settings, there are often barriers in ensuring alignment or fit (Taxman & Belenko, 2012). Aligning practices, such as FABI to fit within the context of school organizations, while innovating and renovating practices in response to contextual barriers is a dynamic process in need of further evaluation as fields to better understand evidence-based adoption and ultimately, sustainability (McCahill et al., 2014, Scott & Eber, 2013).

Implications

In the current dissertation, empowering educators to design, implement, and evaluate functional approaches to assessment and intervention for students who engage in challenging behavior was examined. Across chapters, team-based approaches to FABIs in authentic educational contexts as implemented by typical school personnel are highlighted. Collectively, findings affirm training educators and related school personnel in FABI methodologies is efficacious and effective. In Chapter 2 a review of the literature examined how in-service educators or trained to design, implement, and evaluate FABIs. In Chapter 3, outcomes as well as implications of a practice-based professional learning series to train educators using a team-based were evaluated. In Chapter 4, an implementation science lens was used to contextualize the transportability of FABI from a clinical to school-based model, and implications across various fields and professions. Across chapters, results add to an already robust body of literature supporting team-based approaches to FABI for use in educational settings and by school personnel.

Considerations for Future Research and Practice

A growing body of literature has demonstrated the efficacy of FABI across a range of settings and students (Gann, Umbreit, Ferro, & Liaupsin, 2014). In a recent review of the literature, Anderson, Rodriquez, and Campbell (2015) identified 233 articles across 540 participants, in addition to FABI being implemented to support students with autism and intellectual disability, their review included students with psychiatric diagnoses, emotional or behavioral disorders, learning disabilities, other health impaired, as well as those with no educational classification psychiatric diagnosis. A number of reviews have synthesized and evaluated the methodological quality and/or magnitude effect of FABI; with findings consistently signifying FABIs to be effective in reducing problem behavior and to be methodologically rigorous and possibly an evidence-based practice (Common et al., 2017; Gage et al., 2012; Goh & Bambara, 2010; Lane, Bruhn, Cronobori, & Sewell, 2009; Lane, Kalberg, & Shepcaro, 2009; WWC, 2016; Wood, Oakes, Fettig, & Lane, 2015).

Moving forward, it is recommended additional professional development such as those reviewed in Chapters 2 and 3, and issues pertaining to empowering school personnel and behavior analysts to work in tandem to support these implementation efforts (Chapter 4) be examined. Lane and colleagues (Lane et al., 2007; Lane et al., 2015, Oakes et al., 2017) developed a practice-based professional learning series designed to teach school-based teams how to design, implement, and evaluate FABI to support students exhibiting challenging behavior. These studies have demonstrated that educators and other school personnel as part of a team-based approaches can learn to design, implement, and evaluate FABI leading to functional relations between the introduction of a FABI and lead to desired changes in student behavior.

Future work is still needed to (a) clarify when, who, how, and what constitutes as FABI procedures across different disciplines and contexts (b) the personnel who should be involved in implementation of FABI across disciplines and contexts, and (c) expertise related to FABI, particularly in the educational contexts. Particularly, future research is needed to understand how schools and various professionals can work in tandem to sustain and implement FABI with high degrees of accuracy and fidelity. Finally, FABI is an ideal practice to monitor implementation and scaling up practices from an applied implementation science framework, as it is inherently a multidisciplinary practice that crosses many professions, disciplines, settings, and populations (Shook, 1993; Taxman & Belenko, 2012).

Conclusion

In sum, this dissertation offers to the field how we can advance the current implementation of FABI as part of a team-based approach to better support students with and at-risk for EBD. This dissertation demonstrates designing, implementing, and evaluating FABI are behaviors that can be observed, measured, and ultimately shaped. Given recent calls to pay as much attention in teacher profession to student outcome data as we do teacher outcomes, and recent advances in measuring educator's competency in and implementation of FABI, the future knowledge development and utilization of team-based FABI looks promising.

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Appendices

Appendix 1.

Research Questions and hypotheses

Research Objectives	Research Objectives	Hypotheses
Research Objective 1: To explore procedural integrity of the professional learning series: (capturing what happened within and across each session) and describe stakeholders' experiences.	Research question 1. To what extent did trainers implement the training series and its activities? To what extent did trainees attend to and participate in the training series? What are the differences across cohorts?	Hypothesis 1a. It was predicted trainers will have implemented the professional learning series and its activities with high degree of fidelity. It was also predicted there would be minimal magnitude differences across cohorts given previous literature has demonstrated and shown university-led and state technical assistance-led professional learning around functional approaches to assessment and intervention have led to positive gains in educator outcomes (Browning-Wright et al., 2007; Lane et al., 2015).
		Hypothesis 1b. It was predicted attendees will have attended most training sessions and participated with a high degree of fidelity, given previous literature showing special education, administrators, and support staff have all professional development needs around prioritized behavioral problems and FBA (Pindiprolu, Peterson, & Bergloff, 2007). It was also predicted there would be minimal differences across cohorts, as samples across cohorts were randomized (Ware, Ferron, & Miller, 2012).
	Research question 2. What were coaches' attendance during the training series? Was there coaching between sessions; and if so, how many contacts and in what format?	Hypothesis 2a. It was predicted coaches attended most training sessions and will have had at least one contact in person and via email with teams between each session, given the value of professional development needs in regard to FBA (Pindiprolu et al., 2007). It was also predicted there would be minimal difference across cohorts as samples across cohorts were randomized (Ware et al., 2012).
Research Objective 2: To explore FABI team progress and trainees learning	Research question 3. What is the internal consistency of the KCU survey and its four scales (perceived knowledge, perceived confidence, and	Hypothesis 3a. It was predicted the KCU survey will have high internal consistency across the four scales as previous examinations of this measures internal consistency have been high (α = .94-.95; Lane et al., 2015).

Research Objectives	Research Objectives	Hypotheses
outcomes, including a description of the students with whom they supported.	perceived usefulness's, and actual knowledge)?	
	Research question 4. To what extent did trainees show improvement in knowledge within each session day? To what extent did trainees show improvement in knowledge before and after the training series? What are the differences across cohorts?	Hypothesis 4a. It was predicted trainees will show statistically significant ($\alpha = 0.05$) growth between pre and post daily formative assessments based on positive differences between pre and post knowledge found in similar professional learning series (Lane et al., 2015; Oakes et al., 2017). Hypothesis 4b. It was predicted trainees will demonstrate statistically significant ($\alpha = 0.05$) growth in perceived and actual knowledge, perceived confidence, and perceived usefulness as demonstrated by composite difference scores between pre and post training KCU surveys. These differences will be consistent from previous FABI professional learning series and be statistically significant with large effect sizes (Lane et al., 2015; Oakes et al., 2017). Hypothesis 4c. It was predicted there would not be statistically significant ($\alpha = 0.05$) differences across cohorts, as the training series followed a systematic and manual model for conducting FABI (Umbreit et al., 2007), included case examples across cohorts from the Beyond Behavior special issue (Lane, Oakes, et al., 2011), and included a manualized professional development professional learning model with accompanying training materials (Lane & Oakes, 2014). It was also predicted there would be minimal difference across cohorts as samples across cohorts were randomized (Ware et al., 2012).
	Research question 5. To what extent did teams progress through the FABI process and what was the quality of the	Hypothesis 5a. It was predicted teams would progress through the five step-process similarly to previous training studies (Oakes et al., 2017). Specifically, most teams would complete most items in Step 1: Identifying students who need a FABI and Step 2: Conducting the

Research Objectives	Research Objectives	Hypotheses
	steps completed? What were differences across cohorts?	functional assessment. Further, the majority of teams would begin but not complete Step 3: Collecting baseline data, Step 4: Designing the intervention, and Step 5: Testing the intervention based on previous professional development (Oakes et al., 2017). Hypothesis 5b. It was predicted there would not be statistically significant ($\alpha = 0.05$) differences across cohorts in step completion or step quality if treatment integrity across cohorts was not different, as samples across cohorts was randomized (Ware et al., 2012). Hypothesis 5b. It was predicted there would not be statistically significant ($\alpha = 0.05$) differences across cohorts based on demographic variables (e.g., educational and professional experience), as participant assignment to cohorts was a randomized process in an effort to control for such things as sample parameters specific to individual characteristics (Ware et al., 2012).
Research Objective 3: To explore student outcomes associated with FABI teams designing, implementing, and evaluating a FABI as part of applied learning activities associated with the professional learning series.	Research question 6. To what extend did teams demonstrate a functional relation between the introduction of the independent variable and changes in student performance? Are there differences across cohorts?	Hypothesis 6a. It was predicted most teams would begin but not complete Step 4: Designing the intervention, and/or Step 5: Testing the intervention, as such, it was also predicted most teams would not demonstrate a functional relation between the introduction of the independent variable (BIP) and changes in student performance. Not completing Step 5: Testing the intervention would prevent a functional relation in part due to design constraints (e.g., not withdrawing or reintroducing the intervention; Oakes et al., 2017). Hypothesis 6b. It was predicted there will not be statistically significant ($\alpha = 0.05$) differences across cohorts based on demographic variables, as participant assignment to cohorts was a randomized process to control for this (Ware et al., 2012).

Appendix 2.
District Characteristics.

Variable	Level	Count/Percentage
District [b]	Local	City Large
	Total Schools	89
Students	Total Students [a]	50,947
	White	34.10 - 34.40%
	African American	18.10 – 18.40%
	Hispanic	33.0 – 33.40%
	Other	14.10 -14.40%
	ELL Students [a]	8,807
	Students with IEPS [a]	6,910
	Students who are economically disadvantaged	78.06 – 75.29%
	Students who are migrant	0.83 - 0.78%
	Classroom Teachers (FTE) [a]:	3,473.70
	Student/Teacher Ratio [a]	14.67
Staff [b]	Teachers (FTE)	3,473.70
	Prekindergarten	72.00
	Kindergarten	762.10
	Elementary	941.00
	Secondary	1,698.60
	Ungraded	NA
	Other Staff (FTE)	2,902.10
	Instructional Aides	815.40
	Instructional Coordinators & Supervisors	164.40
	Total Guidance Counselors	Missing
	Librarians/Media Specialists	60.10
	Library/Media Support	1.00
	District Administrators	27.00
	District Administrative Support	153.50
	School Administrators	176.60
	School Administrative Support	239.90
	Student Support Services	464.40
	Other Support Services	799.80

Note. Source [a] National center for Education Statitics (2014-2015). ELL = English language learner; FTE = Full time equivilent; IEP = Individual Education Plan; NA = Non-applicable.

THE UNIVERSITY OF KANSAS
Research

APPROVAL OF PROTOCOL

May 1, 2017

Kathleen Lane
k923l138@ku.edu

Dear Kathleen Lane:

On 5/1/2017, the IRB reviewed the following submission:

Type of Review:	Modification
Title of Study:	Building Capacity for Functional Assessment-Based Intervention's (FABI) in [redacted]: A Professional Development Training Series
Investigator:	Kathleen Lane
IRB ID:	STUDY00001399
Funding:	Name: [redacted], State of
Grant ID:	None
Documents Reviewed:	

The IRB approved the study on 5/1/2017.

1. Notify HSCL about any new investigators not named in original application. Note that new investigators must take the online tutorial at https://rgs.drupal.ku.edu/human_subjects_compliance_training.
2. Any injury to a subject because of the research procedure must be reported immediately.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity.

Continuing review is not required for this project, however you are required to report any significant changes to the protocol prior to altering the project.

Please note university data security and handling requirements for your project:
https://documents.ku.edu/policies/IT/DataClassificationandHandlingProceduresGuide.htm

You must use the final, watermarked version of the consent form, available under the "Documents" tab in eCompliance.

Sincerely,

Stephanie Dyson Elms, MPA
IRB Administrator, KU Lawrence Campus

Human Research Protection Program
Youngberg Hall | 2385 Irving Hill Rd | Lawrence, KS 66045 | (785) 864-7429 | research.ku.edu/hrpp

Appendix 3.
KU Human Subjects Committee – IRB approval

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Wendy Oakes
Division of Teacher Preparation - Polytechnic
-
Wendy.Oakes@asu.edu

Dear Wendy Oakes:

On 7/2/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Building Capacity for Functional Assessment-Based Intervention's (FABI) in [redacted] A Professional Development Training Series (FABI in [redacted]
Investigator:	Wendy Oakes
IRB ID:	STUDY00001257
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Consent Team Member, Category: Consent Form; • Consent Parent, Category: Consent Form; • Protocol, Category: IRB Protocol; • University of Kansas IRB Approved Protocol, Category: IRB Protocol; • IRB Approval KU, Category: Other (to reflect anything not captured above);

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (1) Educational settings on 7/2/2014.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

Appendix 4.

ASU Human Subjects Committee – IRB approval.

Appendix 5.
District Approval Letter.

[redacted]

Kathleen Lynne Lane, Ph.D., BCBA-D
University of Kansas Department of Special Education (SPED)
1122 West Campus Road
JRP Room 541
Lawrence, KS 66045

Re: E-mail dated 7/16/14 – Research Request

Dear Dr. Lane,

This letter is i[redacted]search request *Building Capacity for Functional Assessment-Based Intervention's* [redacted] *Professional Development Training Series* [redacted] in the [redacted]t this time I am pleased to inform you that the Research Council has given approval for your project with the following amendment:

- No student identifiable information is to be used. Student reports are to be identified by an arbitrary number only and are not to include the student's initials. The school's initials may be used to identify the school.

As you proceed with your project, please note that this letter approves the research project as described above and within your application, but that it is incumbent upon the researcher(s) to negotiate distribution. The project also must not unduly increase the workload of any employee of the [redacted] has the right to discontinue participation at any time. If [redacted] what was originally presented in your proposal, the Research Council must be so informed and approve any changes in advance. Copies of any reports related to this research must be submitted to the Office of Innovation & Evaluation and be made available to the participating schools as well. Should you need further information, please feel free to e-mail [redacted]

On behalf of the [redacted]esearch Council,

[redacted]

[redacted]

Appendix 6.
Information Letter

THE UNIVERSITY OF KANSAS
School of Education

Department of Special Education

Greetings!

We are pleased you have decided to attend the Tier 3 behavior training series offered by the [redacted]! Specifically, this training seeks to build schools' capacities to design, implement, and evaluate functional assessment-based interventions as a tertiary support to better serve students with and at-risk for learning and behavior problems.

Because the experiences and outcomes of this training series in your community may help to inform other schools and school districts about how to put a team-based approach to behavioral support in place, Kathleen Lane, Professor at the University of Kansas, would like to use the information obtained during the training series for research purposes.

The intent of this letter is to invite you to participate in a research project, ***Building Capacity for Functional Assessment-Based Intervention's (FABI) in*** [redacted] ***A Professional Development Training Series*** **(FABI in** [redacted] All you would do to participate is allow Dr. Lane and her research staff to analyze (a) the data you will collect over the course of the training process as you design, implement, and evaluate functional assessment-based interventions and (b) the pre-, during, and post measures you will complete to evaluate the overall learning process along with some basic demographic information about you (e.g., gender, years of experience, etc.). This information would be analyzed and shared, without using your name, to learn about the overall effectiveness of this training program.

There are no known risks to you for participating in this study. Your school may benefit if functional assessment-based interventions are implemented. What is learned in that process may help us to improve and refine our future training efforts for other schools and districts.

All information will be treated as confidential. Each participant will be given a unique identification code that is a combination of your team number (which will be assigned by [redacted] and your initials to use on all forms (e.g., EES Team 01 KLL). The researchers will not know which names go with which numbers. For example, each team member from a given school will be given an identification number such as EES Team 01 KLL, EES Team 01 JTC, EES Team 01 CSL, and EES Team 01 AQO (e.g., team number and initials of the adult participants) to show these four people are all at the same school. While we will know the name of your school, we will not keep a record of your name. [redacted] will maintain a master list of team numbers, (e.g., Team 01 KLL = Kathleen Lynne Lane) throughout the training series. This will be destroyed after all data are collected and made reliable.

Once the data are received, all data will be kept in the researcher's locked office at the University of Kansas. The information will be stored indefinitely. By turning in materials completed over the course of the training, you are agreeing to participate. If you decide you do not want to take part, there will be no penalty or loss of benefits to which you are entitled, you simply do not turn in materials you complete. Your training will take place even if you decide not to allow your information pre, during, or post training measure to be analyzed for research purposes. If you agree to participate and the data are received, you will not be able to withdraw the data later as we will have no way of knowing which data are yours (because we are not keeping a master list of your names and identification). However, all information provided as part of the FABI will be analyzed as part of the study. If the parent withdraws, Lane and project staff will not collect any of the student-level data at the end of the training series.

Thank you very much for your willingness to consider participating in the research project by allowing the use of the information that will be obtained as part of the training.

If you have any questions, please contact Kathleen Lane [redacted] Kathleen.Lane@ku.edu]. If you have any general questions about your rights as a research participant, contact the Institutional Review Board of The University of Kansas [(785) 864-7429] - The research study number is 1399.

Respectfully,

Kathleen Lynne Lane, Ph.D., BCBA-D
Professor
University of Kansas
Department of Special Education (SPED)
1122 West Campus Road
JRP Room 541
Lawrence, KS 66045
Office (785) 864 9630
Kathleen.Lane@ku.edu

Appendix 7.
Consent Letter

THE UNIVERSITY OF KANSAS
School of Education

Department of Special Education

To Parents/ Guardians,

As you know, your child is being supported by a school team attending a training series offered by the [redacted] ([redacted] The purpose of the training is to teach teachers, administrators, and other school staff to develop behavior supports for individual students at school, put the support into place, and determine the benefit for each student. It is our belief that participation in this project may improve the ability of these schools to meet the needs of their students.

Because one of our goals is to learn from the experiences and outcomes of the teams attending this training series so that we may help other schools and school districts support students by this team-based approach to behavioral support, we are asking for your participation. Kathleen Lane, Professor at the University of [redacted] would like to use the information from this training series for research on this learning process.

This letter requests your participation in the research project, ***Building Capacity for Functional Assessment-Based Intervention's (FABI) in*** [redacted]***: A Professional Development Training Series*** **(FABI in** [redacted] All you would do to participate is simply allow Dr. Lane and her research staff to analyze the information that the school's team collect during the training process as they provide behavioral supports for your child.

Depending on the age and maturity of your child, it might be helpful if you would discuss this with your child to see if he or she is also comfortable with allowing his/her information to be used to help children and teachers in other schools and school districts. Because we will not be working directly with your child and all activities are consistent with typical school practices, we will not be asking your child directly if they would like to participate.

There are no known risks to you as a parent, and there are no known risks or inconveniences to your child. Even if you decide not to allow your child's information related to the behavior support to be used by Dr. Lane and her research staff, your child will still receive those services at school. That means your child will have the benefit of this support during the school day even if you decide not to participate in this research study.

The students and school staff members at your school may benefit if behavioral interventions are implemented. What is learned in the training process may help us improve and refine our future training efforts for other schools and other children. Information collected would be analyzed and shared, without using anyone's name, to learn about the overall effectiveness of this training series.

All information will be treated as confidential. Each student participant will be assigned their school's initials and an arbitrary student number rather than using their real names. Teachers will use this code on forms they complete about your child. Once the information is shared with researchers it will be stored in either Dr. Lane's locked office at the University of Kansas and labeled with only the study identification number. The information will be stored indefinitely. If you agree to allow the use of the training information for research purposes, you will not be able to withdraw that data as we will have no way of knowing which data belong to your child—the data are truly anonymous.

Thank you very much for your willingness to consider participating in the research project by allowing the use of the information that will be obtained as part of the training. If you have any questions, please contact Kathleen Lane [redacted] Kathleen.Lane@ku.edu]. If you have any general questions about your rights as a research participant, contact the Institutional Review Board of The University of Kansas [(785) 864-7429] - The research study number is 1399.

Respectfully,

Kathleen Lynne Lane, Ph.D., BCBA-D
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Department of Special Education (SPED)
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Lawrence, KS 66045
Office (785) 864 9630
Kathleen.Lane@ku.edu

The information that will be used for the research will be collected as part of the training process during of the school year. The training process will help teachers and staff design and put into place behavioral supports for your child.

If you and your child ARE WILLING to allow information that stems from being involved in the training to be used for research purposes, please indicate YES below.

If you are NOT willing, please indicate NO below.

For either response, please complete the section below so we know who has responded.

__ YES, I/we are willing for the information from the training to be used for research to help improve the training and help others, and to evaluate how the program is working.

OR

__ NO, I/we do not want to allow the information from the training to be used for research nor to evaluate how the program is working. Please **return one copy of this signed form** to your child's teacher, or to Kathleen Lane in the enclosed postage paid envelope.

Parent's Name (Print and Sign) Date

Child's Name Teacher School District

PLEASE KEEP THE SECOND COPY OF THIS LETTER FOR YOUR RECORDS.

Appendix 8.
Overview of Professional Learning Series

Session Day	Agenda, Learning Objectives, Action items
Training Day 1	Agenda • Welcome and Introductions • Pre-Training Assessment: Complete the Knowledge, Confidence, and Use Survey • Overview of functional assessment-based interventions (FABI) • Illustrations • Step 1: Identifying students who need a FABI • Step 2: Conducting the functional assessment • Learning objectives 1. Participants will assess initial knowledge, confidence, and use. 2. Participants will name to steps in the functional assessment. 3. Participants will operationally define behaviors. 4. Participants will identify how data are gathered from multiple stakeholders for the functional assessment. 5. Participants will identify the function(s) of target behavior.
After Day 1	✓ Identify Student (parent consent/ talk with student) ✓ Complete HO1 Referral Form ✓ Complete the Records Review (15 – 30 min; depending on students grade level) ✓ Complete Informal Observation (see checklist) ✓ Complete Universal Checklist (30 min) ✓ Complete the Interviews (30 min ea) o Teacher ~ Parent ~ Student ✓ Complete the SSiS Ratings Scales o Teacher (20 min) o Parent (20 min) ✓ Complete the direct observation A-B-C (3 hrs) ✓ Post all Documents for your coach to review and provide feedback.

Training	Agenda
Day 2	• Welcome and Introductions • Step 3: Collecting Baseline Data Learning objectives 6. Participants will learn how to measure the student's current level of performance. 7. Participants will identify dimensions of behavior and how to use this information for identifying the measurement system. 8. Participants will learn how to measure behavior using two data collection systems: Momentary Time Sampling and Event Recording.

After Day 2	✓ Select behavioral dimension
	✓ Select measurement system
	✓ Finalize data collection procedures
	    ✓ Materials Needed
	    ✓ Data Collection Sheet
	    ✓ Schedule Observation Times
	✓ Get reliable on your measurement system with a team member
	✓ Collect at least 5 baseline data points with at least 2 of those with IOA

Training	Agenda
Day 3	• Welcome and Introductions • Step 4: Designing the Intervention: Using the Function-Based Intervention Decision Model • Pre and post formative assessment

After Day 3	✓ Draft the intervention with A-R-E components
	✓ Share the decision model and intervention with the teacher and revise accordingly
	✓ Design Treatment Integrity form
	✓ Teach the teacher the intervention
	    ✓ Assess social validity
	✓ Teach the student the intervention
	    ✓ Assess social validity
	✓ Continue to collect data when the intervention is being implement
	    ✓ IOA
	    ✓ Graph data

Training	Agenda
Day 4	• Welcome and Introductions • Step 5: Testing the Intervention • Ethical Considerations Learning objectives 9. Participants will learn basic single case design features to test an intervention. 10. Participants will learn basic strategies for analyzing stability, level, and trend of student performance. 11. Participants will learn how to interpret treatment integrity data. 12. Participants will learn how to interpret social validity data.

After Day 4	✓ Examine Intervention Results
	    ✓ Student Behavior
	    ✓ Social Validity
	    ✓ Treatment Integrity
	✓ Programming for generalization
	✓ Discuss challenges and successes
	✓ Discuss the importance of a systematic approach
	✓ Complete the Behavior Intervention Plan reporting

Training	Agenda
Day 5	• Welcome and Introductions • Putting All the Pieces Together: A defensible plan • Reviewing the Tertiary Grid for your Positive Behavior Intervention and Support (PBIS) Plan • Post-training Assessment: Complete the Knowledge, Confidence, and Use Survey Learning Objectives: 13. Participants will synthesis information from all five steps. 14. Participants will share their findings for their first student. 15. Participants will discuss strategies in building fluency of the FABI process. 16. Participants will assess their learning.

After Day 5	✓ Plan supporting second student with district support
	    ✓ Review pacing spreadsheet
	    ✓ Take out calendar and schedule team meetings
	    ✓ Schedule coaching visits
	    ✓ Designate roles for each activity
	    ✓ Clarifying questions from lessons learned with Case 1

Appendix 9.
Training Agendas
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Building Capacity for Functional Assessment-Based Interventions (FABI)
in [redacted] A Professional Learning Training Series

Conducting the Functional Assessment

Kathleen Lynne Lane & Wendy P. Oakes

Session 1 Agenda

September 24, 2014

- **Welcome and Introductions**
- **Pre-training Assessment: Complete the Knowledge, Confidence, and Use Survey**
- ***Overview of Functional Assessment-Based Interventions (FABI)***
- ***Illustrations***
- ***Step 1: Identifying Students Who Need a FABI***
- ***Step 2: Conducting the Functional Assessment***
- Step 3: Collecting Baseline Data
- Step 4: Designing the Intervention: Using the Function-Based Intervention Decision Model
- Step 5: Testing the Intervention
- Ethical Considerations
- Putting All the Pieces Together: A defensible plan
- Reviewing the Tertiary Grid for your Positive Behavior Intervention and Support (PBIS) Plan
- Post-training Assessment: Complete the Knowledge, Confidence, and Use Survey

Learning Objectives:

1. Participants will assess initial knowledge, confidence, and use.
2. Participants will name to steps in the functional assessment.

3. Participants will operationally define behaviors.

4. Participants will identify how data are gathered from multiple stakeholders for the functional assessment.

5. Participants will identify the function(s) of target behavior.

Building Capacity for Functional Assessment-Based Interventions (FABI) in [redacted] A Professional Learning Training Series

Collecting Baseline Data

Kathleen Lynne Lane & Wendy P. Oakes

Session 2 Agenda

October 20, 2014

- Welcome and Introductions
- Pre-training Assessment: Complete the Knowledge, Confidence, and Use Survey
- Overview of Functional Assessment-Based Interventions (FABI)
- Illustrations
- Step 1: Identifying Students Who Need a FABI
- Step 2: Conducting the Functional Assessment
- ***Step 3: Collecting Baseline Data***
- Step 4: Designing the Intervention: Using the Function-Based Intervention Decision Model
- Step 5: Testing the Intervention
- Ethical Considerations
- Putting All the Pieces Together: A defensible plan
- Reviewing the Tertiary Grid for your Positive Behavior Intervention and Support (PBIS) Plan
- Post-training Assessment: Complete the Knowledge, Confidence, and Use Survey

Learning Outcomes:

1. Participants will learn how to measure the student's current level of performance.

Building Capacity for Functional Assessment-Based Interventions (FABI) in [redacted] A Professional Learning Training Series

- Designing Your Intervention -

Kathleen Lynne Lane & Wendy P. Oakes

Session 3 Agenda

November 17, 2014

- Welcome and Introductions
- Pre-training Assessment: Complete the Knowledge, Confidence, and Use Survey
- Overview of Functional Assessment-Based Interventions (FABI)
- Illustrations
- Step 1: Identifying Students Who Need a FABI
- Step 2: Conducting the Functional Assessment
- Step 3: Collecting Baseline Data
- ***Step 4: Designing the Intervention: Using the Function-Based Intervention Decision Model***
- Step 5: Testing the Intervention
- Ethical Considerations
- Putting All the Pieces Together: A defensible plan
- Reviewing the Tertiary Grid for your Positive Behavior Intervention and Support (PBIS) Plan
- Post-training Assessment: Complete the Knowledge, Confidence, and Use Survey

Learning Objectives:

1. Participants will be able to identify the difference between acquisition and performance deficits.

2. Participants will learn how to use the Function-based Intervention Decision Model to select the appropriate intervention method.

3. Participants will learn how to design an intervention including antecedent adjustments, shifts in the rate of reinforcement, and extinction components (A-R-E).

4. Participants will learn how to assess treatment integrity.

5. Participants will learn how to assess social validity.

6. Participants will learn how to program for generalization and maintenance.

Building Capacity for Functional Assessment-Based Interventions (FABI) in [redacted] A Professional Learning Training Series

- Testing Your Intervention -

Kathleen Lynne Lane & Wendy P. Oakes

Session 4 Agenda

December 15, 2014

- Welcome and Introductions
- Pre-training Assessment: Complete the Knowledge, Confidence, and Use Survey
- Overview of Functional Assessment-Based Interventions (FABI)
- Illustrations
- Step 1: Identifying Students Who Need a FABI
- Step 2: Conducting the Functional Assessment
- Step 3: Collecting Baseline Data
- Step 4: Designing the Intervention: Using the Function-Based Intervention Decision Model
- ***Step 5: Testing the Intervention***
- ***Ethical Considerations***
- Putting All the Pieces Together: A defensible plan
- Reviewing the Tertiary Grid for your Positive Behavior Intervention and Support (PBIS) Plan
- Post-training Assessment: Complete the Knowledge, Confidence, and Use Survey

Learning Objectives:

1. Participants will learn basic single case design features to test an intervention.

2. Participants will learn basic strategies for analyzing stability, level, and trend of student performance.

3. Participants will learn how to interpret treatment integrity data.

4. Participants will learn how to interpret social validity data.

Building Capacity for Functional Assessment-Based Interventions (FABI) in [redacted] A Professional Learning Training Series

- Putting All the Pieces Together -

Kathleen Lynne Lane & Wendy P. Oakes

Session 5 Agenda

January 26, 2015

- Welcome and Introductions
- Pre-training Assessment: Complete the Knowledge, Confidence, and Use Survey
- Overview of Functional Assessment-Based Interventions (FABI)
- Illustrations
- Step 1: Identifying Students Who Need a FABI
- Step 2: Conducting the Functional Assessment
- Step 3: Collecting Baseline Data
- Step 4: Designing the Intervention: Using the Function-Based Intervention Decision Model
- Step 5: Testing the Intervention
- Ethical Considerations
- ***Putting All the Pieces Together: A defensible plan***
- ***Reviewing the Tertiary Grid for your Positive Behavior Intervention and Support (PBIS) Plan***
- ***Post-training Assessment: Complete the Knowledge, Confidence, and Use Survey***

Learning Objectives:

1. Participants will synthesis information from all five steps.

2. Participants will share their findings for their first student.
3. Participants will discuss strategies in building fluency of the FABI process.
4. Participants will assess their learning.

Appendix 10.

Step Checklis

Completion Checklist
Step 1: Identifying students who need a FABI
Team Number _____

School: __________________ **District:** ________________ **Date:** ________________

Team Member Id Number (e.g., KUES Team01 KLL):

1. ______________________________ 5. __________________________________
2. ______________________________ 6. __________________________________
3. ______________________________ 7. __________________________________
4. ______________________________ 8. __________________________________

Coach: ____________________________________

Step 1: Identifying students who need a FABI

	Check when completed	**Item**
Estimated Time: 1 week Start Date: _____ End Date: _____	☐	Communicate with parents and secure permission to conduct the Functional Assessment based intervention (use your district procedures and forms for subsequent students). *For fall 2014, turn in signed parent consent form (on University of Kansas [KU] Letter head) for training case to coaches. Do not post. This is a study related document.
	☐	Talk to the student to answer questions (assent according to your district procedures)
	☐	Complete, confirm, and turn in **Referral Checklist: Functional Assessment-Based Interventions (HO1)** (*Post – using student initials only)*

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Used with permission: Lane, K. L., & Oakes, W. P. (2014). Functional assessment-based interventions (FABI): Training Materials – Step-by-step checklists.

Considerations for need:

1. ___Does the student's behavior impede his or her learning or the learning of other? Or, does the student pose a threat to him or herself or others (Drasgow & Yell, 2001)?

2. ___Has the student been non-responsive to other intervention efforts?

3. ___Does the student have multiple risk factors (e.g., harsh and inconsistent parenting or high mobility) making him or her more susceptible to school failure and/or dangerous behavior?

4. ___Has the student been (a) placed in an alternative setting for behavior dangerous to him or herself or others (b) placed in an alternative setting for 45 days due to drug or weapons violations? Or (c), has the student been suspended from school for more than 10 days or has that suspension resulted in a change in placement (Drasgow & Yell, 2001)?

*If you answered yes to the first three questions, a FABI may be warranted. If you answered yes to the fourth question, a FABI is mandated by the Individuals with Disabilities Act (IDEA, 2004).

Suggested Readings

1. In the Beyond Behavior Special Issue, read in the method section of articles 2-4 to see how these elementary, middle, and high school students were identified as potentially benefiting from a Tier 3 Functional Assessment Based Intervention (FABI).

2. Read Chapter 1 in the following book to learn about a functional approach to problem behavior:

   Umbreit, J., Ferro, J., Liaupsin, C., & Lane, K. (2007). *Functional behavioral assessment and function-based intervention: An effective, practical approach.* Upper Saddle River, N. J.: Prentice-Hall.

3. Consider reading more about the various systematic screening tools in:

   Lane, K. L., Menzies, H. M, Oakes, W. P., & Kalberg, J. R. (2012). *Systematic screenings of behavior to support instruction: From preschool to high school.* New York, NY: Guilford Press.

Step 1 Tips:

1. Make certain Tier 1 efforts are being implemented as planned (with treatment integrity).

2. Consider Tier 2 supports prior to beginning with a functional assessment-based intervention (FABI).

3. Ensure a systematic approach is used to detect which students may benefit from a FABI to make certain students have equal access to this support.

4. Obtain permission from the parent or guardian as well as the student before beginning this process.

Completion Checklist
Step 2: Conducting the Functional Assessment
Team Number _____

School: __________________ **District:** ________________ **Date:** ________________

Team Member Id Number (e.g., KUES Team01 KLL):

1. ______________________________ 5. __________________________________
2. ______________________________ 6. __________________________________
3. ______________________________ 7. __________________________________
4. ______________________________ 8. __________________________________

Coach: ___________________________________

Step 2: Conducting the functional assessment

Check when completed	**Item**
☐	Complete, confirm, and turn in **Data collected from Informal Observation: Classroom Map; copy of PBIS plan; instructional schedule; classwide system for behavior management** *(Posted)*
☐	Complete, confirm, and turn in **Universal Checklist HO A** *(Posted)*
☐	**Step 2.1 Records Review** Complete **HO 2 and 3 SARS Forms** *(Posted)*
☐	**Step 2.2 Interviews** Complete, confirm, and turn in **HO 4 Teacher Interview, including operational definition of target behavior** *(Posted)*
☐	Complete and confirm **HO 6 FABI Planning for Target Behavior** with operational definition [Confirmed with Coach] *(do not post as this is a document in progress)*
☐	Complete, confirm, and turn in **HO 4 Parent Interview** *(Posted)*
☐	Complete, confirm, and turn in **HO 7 Student Interview** *(Posted)*
☐	**Step 2.3 Rating Scales** Review, confirm, and turn in **Social Skills Improvement System – Rating Scale (Teacher Version)**; Scored by Coach; Report *(Post the output of the report generated by the coach, make certain this does not any identifying information)*

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 2: Conducting the Functional Assessment
Team Number _____

☐	Review, confirm, and turn in **Social Skills Improvement System – Rating Scale (Parent Version)**); Scored by Coach; Report *(Post the output of the report generated by the coach, make certain this does not any identifying information)*
☐ __/hours __/instances	**Step 2.4 Direct Observation (A-B-C Data Collection)** Review, confirm, and turn in **HO 8 A-B-C data (data collection form);** write in the number of hours (N = 3) you collected A-B-C and the number of instances (N = 8 minimum) you saw the target behavior occur (Check that data and time are recorded). *(Posted)*
☐	**Step 2.5 Identify the Function** Write and confirm **HO 6, p. 3 Function Matrix,** include a **hypothesis statement** as to what is maintaining the behavior *(Posted)*
☐	Complete, confirm, and turn in **HO 6 FABI Planning for Replacement Behavior** with operational definitions [Confirmed with Coach] *(Posted)*
☐	Complete and turn this checklist into your coach. (To clarify: Complete HO 6 pp. 1-3 up to function matrix and hypothesis. You will be given feedback on your progress prior to completing subsequent pages.)

Suggested Readings

1. In the Beyond Behavior Special Issues:
   a. Read the first article to learn more about the tools and overall process.
   b. Read in the method section of articles 2-4 to see how the functional assessment process was conducted and learn how to complete the function matrix

2. Read the following chapters in

   Umbreit, J., Ferro, J., Liaupsin, C., & Lane, K. (2007). *Functional behavioral assessment and function-based intervention: An effective, practical approach.* Upper Saddle River, N. J.: Prentice-Hall.
   a. Chapter 2 to learn how to identify the target and replacement behaviors
   b. Chapter 3 to learn more about teacher, parent, and student interviews
   c. Chapter 4 to learn more about how to collect A-B-C data

Step 2 Tips:

1. When defining the target behavior, make certain to include a label, definition, examples, and nonexamples. Also, remember to observe the "dead man's rule."

2. A-B-C data (3 hours; 8-10 instances) are analyzed using the function matrix to determine the reasons why the target behavior occurs. These data are not graphed.

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 3: Collecting Baseline Data
Team Number ___

School: __________________ **District:** ________________ **Date:** ________________

Team Member Id Number (e.g., KUES Team01 KLL):

1. ______________________________ 5. __________________________________
2. ______________________________ 6. __________________________________
3. ______________________________ 7. __________________________________
4. ______________________________ 8. __________________________________

Coach: ___________________________________

Step 3: Collecting Baseline Data

Check when completed	**Item**
☐	Complete and confirm pages 1 through 4 on **HO 6 Planning Sheet** *(Reviewed by Coach and Posted)*
☐	What is the behavioral dimension you are focusing on? (see pages 1 and 2, under target and placement behaviors in **HO 6**)
☐	What measurement system did you select to measure behavior? (see pages 1 and 2, under target and placement behaviors in **HO 6**)
☐	Describe the data collection procedures you will use to measure the behavior: materials needed, data collection sheet, scheduled observation times.
☐	How did your team become reliable in data collection? Explain here:
☐ __Sessions	How many reliability data observations were completed?

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 3: Collecting Baseline Data
Team Number ___

☐ __ %	What was the percent of agreement between observers (inter-observer agreement; IOA) on the data collection training (reliability training)?
☐ __ data points	How many baseline data points did you collect? *(Posted)*
☐ __ points with IOA	How many baseline data points included IOA? (at least 25% of observations) *(Posted)*
☐ __ %	What was your IOA for baseline?
☐	Graph your baseline data *(Posted)*
☐	Complete and turn this checklist into your coach.

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 3: Collecting Baseline Data
Team Number ___

Suggested Readings

1. In the Beyond Behavior Special Issues:
    a. Read in the method section of articles 2-4 to see how the behavior was measured (e.g., what dimension? What recording system? How often was reliability assessed) and how people became reliable in the measurement system
    b. In these same articles, review the graphs to see how the data are displayed

2. Read Chapter 9 in the following book to learn how to identify an appropriate measurement system

    Umbreit, J., Ferro, J., Liaupsin, C., & Lane, K. (2007). *Functional behavioral assessment and function-based intervention: An effective, practical approach.* Upper Saddle River, N. J.: Prentice-Hall.

Step 3 Tips:

1. Make sure you pick a measurement system that allows you to capture the dimension of interest.

2. Be certain to pick a recording system that is feasible and reliable and stay with the same data collection system in each intervention phase.

3. Train with other data collectors before you begin collecting baseline data to be certain the data you are graphing and interpret is truly measuring student performance.

4. You will be measuring and graphing the target and/or replacement behavior.

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 4: Designing the Intervention
Team Number_____

School: ___________________ **District:** _________________ **Date:** _________________

Team Member Id Number (e.g., KUES Team01 KLL):

1. ________________________________ 5. ____________________________________
2. ________________________________ 6. ____________________________________
3. ________________________________ 7. ____________________________________
4. ________________________________ 8. ____________________________________

Coach: ______________________________________

Step 4: Designing the Intervention

Check when completed	Item
☐	**Step 4.1 Select an Intervention Method** Select Intervention Method and confirm with teacher –**HO 6 pages 4-9**
☐	**Step 4.2 Develop Intervention Components** Draft A-R-E components (**A**ntecedent adjustments, **R**einforcement adjustments, and **E**xtinction components) Link each intervention tactic to the hypothesized function on the planning sheet (page 6, 7, 8, or 9 depending on the method you select according to the functional assessment intervention decision model. *(Posted)*
☐	**Step 4.3 Components Related to Valid Inference Making** Draft Treatment Integrity Form including quality rubric **HO 11** *(Posted)*
☐	Select and review social validity forms **HO 12.1 and 13.1** *(Posted)*
☐	Prepare a plan for introducing the intervention to the teacher – include a check for understanding. Describe how it was done here: *(Posted)*

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 4: Designing the Intervention
Team Number_____

☐	Prepare a plan for introducing the intervention to the students – include a check for understanding. Describe how it was done here: *(Posted)*
☐	Revise and finalize A-R-E Intervention Components using feedback from the teacher and draft final TI form HO 11 *(Posted)*
☐	Prepare intervention materials
☐	Collect additional baseline data after any school breaks (3 pts.) with at least 1 IOA.
☐	Complete and turn this checklist into your coach.

Suggested Readings

1. In the Beyond Behavior Special Issues:
   a. Read the first article to learn more about how to use the Function Based Intervention Decision Model to select an intervention method.

   b. Read in the method section of articles 2-4 to see how the Function Based Intervention Decision Model was used to identify an intervention method and how the A-R-E tactics were linked back to the students' maintaining function of their target behavior.
2. Read the following chapters in

   Umbreit, J., Ferro, J., Liaupsin, C., & Lane, K. (2007). *Functional behavioral assessment and function-based intervention: An effective, practical approach.* Upper Saddle River, N. J.: Prentice-Hall.
   a. Chapter 6 and 14 to learn about Method 1: Teach the Replacement Behavior
   b. Chapter 7 and 15 to learn about Method 2: Improve the Environment
   c. Chapter 8 and 16 to learn about Method 3: Adjust the Contingencies
   d. Chapter 12 to learn more factors that impact success: social validity, treatment integrity, as well as generalization and maintenance

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Used with permission: Lane, K. L., & Oakes, W. P. (2014). Functional assessment-based interventions (FABI): Training Materials – Step-by-step checklists.

Completion Checklist
Step 4: Designing the Intervention
Team Number_____

Step 4 Tips:

1. Make sure you have sufficient evidence to answer the two questions constituting the Function Based Intervention Decision Model.

2. Align the A-R-E intervention tactics with the maintaining functions determined using the function matrix.

3. Make certain all stakeholders are comfortable with the specific A-R-E tactics and have sufficient training and support to put these in place as designed.

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 5: Testing the Intervention
Team Number _____

School: __________________ **District:** ________________ **Date:** ________________

Team Member Id Number (e.g., KUES Team01 KLL):

1. ______________________________ 5. __________________________________
2. ______________________________ 6. __________________________________
3. ______________________________ 7. __________________________________
4. ______________________________ 8. __________________________________

Coach: ___________________________________

Step 5: Testing the Intervention

Check when completed	Item
☐	Implement Intervention
☐	Collect Treatment Integrity data daily (teacher perspective) with IOA for 25% of sessions (outside team observer). *(Posted)*
☐	Collect Min of 5 data points (behavior measurement – same behavior and measurement system as baseline) – with 25% IOA [Report as number of sessions, % of sessions, and actual IOA %] *(Posted)*
☐ __ data points	How many intervention data points did your collect? *(Posted)*
☐ __ pts with IOA	How many intervention data points included IOA? *(Posted)*
☐ __ %	What was your IOA for intervention? *(Posted)*

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 5: Testing the Intervention
Team Number _____

☐	Graph your intervention data. *(Post for coaches review and for support for deciding when to withdrawal the intervention)*
☐	Withdrawal of the intervention with at least 3 data points (1 IOA)***Note phase change decisions for each phase are guided by student performance on variables measured** *(Posted)*
☐	Complete Treatment Integrity Form (daily by interventionist [teacher] 25% IOA) *(Posted)*
☐	Graph withdrawal data *(Post for coaches review)*
☐	Reintroduce the intervention.
☐	Collect Treatment Integrity data daily (teacher perspective) with IOA for 25% of sessions (outside team observer). *(Posted)*
☐	Collect Min of 3 data points (behavior measurement – same behavior and measurement system throughout all phases) – with 25% IOA [Report as number of sessions, % of sessions, and actual IOA %] *(Posted)*
☐	Plan for follow up data collection to assess maintenance. **HO 6 and 6.1** *(Posted)*
☐	Work with your coaches to complete behavior intervention plan and graphed data to share with teacher and parents *(Posted)*

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Completion Checklist
Step 5: Testing the Intervention
Team Number _____

☐	Conduct final check of ethical considerations **HO 14** *(Posted)*
☐	After reviewing final graph, assess POST social validity. **HO 12.2** Teacher and **HO 13.2** Student *(Posted)*
☐	Complete and turn this checklist into your coach.

Suggested Readings

1. In the Beyond Behavior Special Issues, read the method, results, and discussion section of articles 2-4 to see how the intervention was design, implemented, and evaluated

2. Read the following chapters in

   Umbreit, J., Ferro, J., Liaupsin, C., & Lane, K. (2007). *Functional behavioral assessment and function-based intervention: An effective, practical approach.* Upper Saddle River, N. J.: Prentice-Hall.
   a. Chapter 10 to learn how to test the intervention
   b. Chapter 13 to learn how to monitor the intervention and analyze intervention outcomes

Step 5 Tips:

1. Be sure you use an experimental design to make certain you can actually demonstrate a function relation between the introduction of the intervention and changes in student performance.

2. Phase changes are determine by examining data (e.g., stability, level, and trend) and are not determined by the amount of time a student spends in each phase.

3. Phase changes should not occur before or after breaks in the school year calendar.

4. Be certain to collect treatment integrity data with each introduction of the intervention.

5. The post-intervention social validity measures are completed by stakeholders after the intervention has been tested and the outcomes (e.g., graph and other data) have been shared with and explained to the stakeholders.

6. When you complete HO 6.1, remember it will be used by the current and future teachers. Be certain to include a blank copy of the treatment integrity form for future use as well as a completed graph showing the complete intervention outcomes.

Form Updated (FABI in [redacted] 08/14/2014
From Lane, K. L., & Oakes, W. P. (2014). Building efficiencies in functional assessment-based interventions: A focus on training and coaching. *Manuscript in preparation.*

Appendix 11.

Procedural Fidelity Observation Tool

FABI in [redacted]

Training Series Procedural Fidelity Observation Tool

Presenter: ______________________ Observer: ______________________

Session Date: __________ Start time: __________ End time: ________ Total time: ________

Location: ______________________ Session: ______________________

Teams Present (Team Numbers): ____________District Coaches Present: ______________

Teams Observed: ____________________

Presenters/ District Coaches	FABI Teams
2 = Fully implemented	2 = Yes
1 = Partially implemented	1 = Partially
0 = Not implemented	0 = No

Item	**Presenters**	**District Coaches**	**Teams**
1. Preparation: All materials are prepared in advance and ready	0 1 2	0 1 2	0 1 2
2. Session began on time (2 = on time; 1 = within 15 min; 0 = more than 15 min late starting or early)	0 1 2		
3. Team members and district coaches were on time and ready to begin. ___/ ___total present __/__total who arrived after start of session (score 2 if 5% or fewer were late or still setting up)		0 1 2	0 1 2
4. Presenters gave pre and post measure. Team members and district coaches independently completed pre and post measure.	0 1 2	0 1 2	0 1 2
5. **Sessions 1 and 5 only**. Presenters allowed time for KCU completion; all participants (Presenters, Team members and District coaches) completed the KCUs.	0 1 2	0 1 2	0 1 2
6. Coaches sat with teams.		0 1 2	
7. Coaches and team members engaged in discussion during talk times.		~~0 1 2~~	0 1 2
8. Coaches and team members refrained from discussion during presentation of information or group sharing (before lunch).		~~0 1 2~~	0 1 2
9. Coaches and team members refrained from discussion during presentation of information or group sharing (after lunch).		~~0 1 2~~	0 1 2
10. Teams and coaches discussion were on topic (2 = all on topic, 1 = majority on topic, 0 = majority off topic) Tally/ Time (one time per hour): 1: _________/_____; 2: __________/_____; 3: __________/______; 4:__________/_____; 5 __________/_____; 6: __________/_____		~~0 1 2~~	0 1 2
11. Presenters allowed the planned times for activities; Teams participated in activities (e.g., stayed in room).	0 1 2	0 1 2	0 1 2

Oakes, W. P., Lane, K. L., et al. (2014). Functional Assessment-based Intervention (FABI) Professional Learning Series Procedural Fidelity Observation Tool. *Unpublished Tool*

12. Pacing adhered to pacing sheet (within reasonable time points, content before lunch completed, etc.).	0 1 2		
13. Presenters clearly explained activities (indicated by few clarifying questions, requests for additional directions, or expressions of confusion); teams begin work after directions presented (≤ 1 min; 2 = all teams begin, 1 = majority of teams begin, 0 = majority of teams delay)	0 1 2		0 1 2
14. Presenters and district coaches used key terminology and concepts accurately (check all that were presented). Rate overall accuracy of concept usage. ☐ A-B-C data collection ☐ Momentary time sampling ☐ Acquisition deficit ☐ Operational definitions of behavior ☐ Antecedent adjustments ☐ Performance deficit ☐ Extinction ☐ Positive reinforcement ☐ Function Matrix ☐ Replacement behavior ☐ Functional assessment-based intervention ☐ Functional assessment interview ☐ Social Validity ☐ Generalization and maintenance ☐ Treatment Integrity Team members used terminology (instead of other terms) when asking questions or sharing.	0 1 2	~~0 1 2~~	~~0 1 2~~
15. Presenters presented all slides. Total Session Slides: ________ Total Presented: _______ Total Skipped: _______ Total Remaining at the end of the session: _____	0 1 2		
16. Presenters and district coaches reminded and supported team members in uploading current files to the document storage platform.	0 1 2	0 1 2	
17. Session ended on time (2 = on time; 1 = within 15 min of end time late or within 30 min of end time early; 0 = more than 15 min late ending or more than 30 min early)	0 1 2		
18. Participants remained engaged and present until the end of the session. ___total present at end ___total who left prior to end (score 2 if 5% or fewer left early)		0 1 2	0 1 2
TOTAL EARNED			
Presenters: [Total earned] ÷ [22] = District Coaches: [Total earned] ÷ [16] = Team members: : [Total earned] ÷ [22] =	%	%	%

FABI in [redacted]

Training Series Procedural Fidelity Observation Tool – SCORING RUBRIC

Presenters/ District Coaches
2 – Fully implemented
1 = Partially implemented
0 = Not implemented

FABI Teams
2 – Yes
1 = Partially
0 = No

Date: ______________________

Cohort: ______________________

Observer: ______________________

PS: Pacing Sheet
FA: Formative Assessment Data
KD: Key Definitions
HC: Hard Copy
PPT: PowerPoint

	0 – Not Implemented/ No	1 – Partially Implemented/ Partially	2 – Fully Implemented/ Yes
1. Preparation: All materials are prepared in advance and ready	**Presenters**: Materials not prepared on time. Still being printed or missing. **District coaches**: Without computer, no access to teams' documents. **Team members**: No access to documents, other (missing) team member has materials on their computer.	**Presenters:** Majority of materials and presentation prepared, few or minor missing items, or tech difficulties. **District coaches:** Preparing last min or after start of session. Missing computer that does not inhibit support of team, not able fully participate with selected tech (iPad). **Team members**: Documents available. but disorganized causing a delay in engaging at start of training or activities.	**Presenters**: Materials are prepared, disseminated as planned, PPT ready, and tech tested. **District coaches**: All materials ready prior to start of session. **Team members**: All materials ready prior to start of session. If using a computer, it is started and the PPT is pulled up on screen with access to platform and internet.
2. Session began on time (2 = on time; 1 = within 5 min; 0 = more than 5 min late starting) **(See PS)**	**Presenters**: Started more than 15 min late or early.	**Presenters**: Started within 15 min of starting time (early or late).	**Presenters**: Began on time.

	0 – Not Implemented/ No	1 – Partially Implemented/ Partially	2 – Fully Implemented/ Yes
	were standing at the back of the room, sitting together (not with the school teams), or out of the room.	the room (e.g., phone call) one time or stood in the back during presentation times.	was present (exception, quick bathroom break).
7. District coaches and team members engaged in discussion during talk times.	**District coaches**: Coaches were talking with teams but more off-topic than on-topic, coaches leave the room during work or discussion times. Individuals are quietly working on other tasks (grades, email, and texting). **Team members**: Team members were talking with each other and coaches but more off-topic than on-topic; coaches leave the room during work or discussion times. Individuals are quietly working on other tasks (grades, email)	**District coaches**: Coaches and teams are most often engaged. The majority of coaches are sitting (or standing) with and discussing on-topic activities with team members. **Team members**: Team members are most often engaged. The majority of team members are sitting (or standing) with and discussing on-topic activities with other team members and/or coaches.	**District coaches:** At least 80% of coaches are engaged with teams – at the table, discussions on topic, offering guidance and feedback. **Team members:** At least 80% of team members are engaged with the content and each other. Teams are discussing, completing activities, and engaging with coach.
8. District coaches and team members refrained from discussion during presentation of information or group sharing (before lunch).	**District coaches**: Coaches were talking with teams and/or each other during the presentation. **Team members**: Team members were talking with coaches and/or tablemates during the presentation.	**District coaches**: Coaches had some limited discussions during the presentation and/or occasional commentary. **Team members**: Team members had some limited discussions during the presentation and/or occasional commentary.	**District coaches**: At least 80% of coaches were attentive during the presentation by refraining from talking. **Team members**: At least 80% of Team Members were attentive and engaged throughout the presentation.
9. District coaches and team members refrained from discussion during presentation of information or group sharing (after lunch).	**District coaches**: Coaches were talking with teams and/or each other during the presentation.	**District coaches**: Coaches had some limited discussions during the presentation and/or occasional commentary.	**District coaches**: At least 80% of coaches were attentive during the presentation by refraining from talking.

	0 – Not Implemented/ No	1 – Partially Implemented/ Partially	2 – Fully Implemented/ Yes
	Team members: Team members were talking with coaches and/or tablemates during the presentation.	**Team members**: Team members had some limited discussions during the presentation and/or occasional commentary.	**Team members**: At least 80% of Team Members were attentive and engaged throughout the presentation.
10. Teams and district coaches discussion were on topic (2 = all on topic, 1 = majority on topic, 0 – majority off topic) Tally/ Time (one time per hour): 1: _________/_____ 2: ___________/_____ 3: ___________/_____ 4: ___________/_____ 5 ___________/_____ 6: ___________/_____ 7. ___________/_____ Hourly Sweep Time: 50's (8:50 A.M, 9:50 A.M, 10:50 A.M., etc.) mark on **the table team map**, team engagement Y or N rubric score based on number	**District coaches**: At least 80% were off-topic at each of the checkpoints. **Team members**: At least 80% were off-topic at each of the checkpoints. e.g., discussing other topics, working alone, checking email, or leaving the room.	**District coaches**: Less than 80% were on-topic at each of the checkpoints. **Team members**: Less than 80% were on-topic at each of the checkpoints. e.g., discussing the topic at hand, with some members occasionally drifting to other topics, tasks (e.g., grading, email, texting), and leaving the room.	**District coaches**: At least 80% were on-topic at each of the checkpoints. **Team members**: At least 80% were on-topic at each of the checkpoints. e.g., attending to the material and tasks by engaging in discussions; making appropriate motor responses, (e.g., talking about the topic given by presenters); asking questions for clarification; interacting with presenters, district coaches, and teammates about discussion topics; listen to presenters instructions and directions for discussion activities.
11. Presenters allowed the planned times for activities; Teams participate in activities (e.g., stayed in room). **(See PS)**	**Presenters**: Skipped planned time for activities **District coaches**: At least 80% were off-task during activities.	**Presenters**: Shortened the activity time planned **District coaches**: Less than 80% were on-task during activities.	**Presenters:** Time for activities was allowed as planned. **District coaches**: At least 80% on-task during activities.

	0 – Not Implemented/ No	1 – Partially Implemented/ Partially	2 – Fully Implemented/ Yes
	Team members: At least 80% were off-task during activities. e.g., discussing other topics, working alone, checking email, leaving the room.	**Team members**: Less than 80% were on-task during activities. e.g., discussing the topic at hand, with some members occasionally drifting to other topics, tasks (e.g., grading, email, texting), and leaving the room.	**Team members**: At least 80% on-task during activities. e.g., attending to the material and tasks by engaging in discussions; making appropriate motor responses, (e.g., talking about the topic given by presenters); asking questions for clarification: interacting with presenters, district coaches, and teammates about discussion topics; listen to presenters instructions and directions for discussion activities.
12. Pacing adhered to pacing sheet (within reasonable time points, content before lunch completed, etc.) **(See PS)**	**Presenters**: Loosely followed the pacing sheet, missing big content areas both before and after lunch, running out of time and skipping important content.	**Presenters**: Some topics had more time than planned and others less (not due to questions or need for clarification but from presenter pacing). Some topics skipped to accommodate time. Ok to skip examples.	**Presenters**: Content within major topic areas covered on schedule, topics scheduled before lunch completed, and after lunch completed. All topics completed. Ok to skip examples if not needed or expand on content to answer questions or clarify concepts.
13. Presenters clearly explained activities (indicated by few clarifying questions, requests for additional directions, or expressions of confusion); teams begin work after directions presented (≤ 1 min; 2 – all teams begin, 1 – majority of teams begin, 0 = majority of teams delay)	**Presenters**: Vague or confusing directions were provided. Stopped group for additional clarification. Asked teams to begin before checking for understanding. **Team members**: Majority of the teams delay getting starting with the activities.	**Presenters**: Explained activities, but overlooked expressions of confusion or additional questions (e.g., failed to notice people who raised their hand to indicate a question). **Team members**: Majority of the teams begin activity after directions are presented.	**Presenters**: Explicitly explained activities and checked for understanding and allowed (or expressed a plan) for questions. **Team members**: All teams begin work after directions are presented.
14. Presenters and district coaches used key terminology and concepts accurately (check all that were presented). Rate overall accuracy of concept usage. – A-B-C data collection Acquisition deficit	**Presenters**: Presenters did not use key terminology and concepts accurately (e.g., describing social validity, but referring to it as treatment integrity).	**Presenters**: Presenters used key terminology and concepts with less than 5% accuracy. **District coaches**: Used key terminology and concepts with less than 5% accuracy.	**Presenters**: Presenters used key terminology and concepts with 95% accuracy. **District coaches**: Used key terminology and concepts with 95% accuracy.

	0 – Not Implemented/ No	1 – Partially Implemented/ Partially	2 – Fully Implemented/ Yes
Antecedent adjustments ☐ Extinction ☐ Function Matrix Functional assessment-based intervention Functional assessment interview ☐ Generalization and maintenance ☐ Momentary time sampling Operational definitions of behavior ☐ Performance deficit ☐ Positive reinforcement ☐ Replacement behavior Social Validity ☐ Treatment Integrity Team members used terminology (instead of other terms) when asking questions or sharing. **(See KD)**	**District coaches**: Did not use accurate terminology and concepts. **Team members**: Did not use accurate terminology and concepts.	**Team members**: Some team members used the key terminology and concepts accurately.	**Team members**: Most uses of team members used key terminology and concepts accurately.
15. Presenters presented all slides. Total Session Slides: ________ Total Presented: _______ Total Skipped: _______ Total Remaining at the end of the session: _____ **(See PS/HC of PPT)**	**Presenters**: More than 50% of slides were skipped.	**Presenters**: Between 50% and 95% of slides used.	**Presenters**: Incorporated 95% to 100% of the PowerPoint slides into the presentation.
16. Presenters and district coaches reminded and supported team members in uploading current files to the document storage platform.	**Presenters**: Did not remind or support team members in uploading current files to the document storage platform. **District coaches**: Did not remind or support team members in uploading current files to the document storage platform.	**Presenters**: Either reminded team members to upload current files or supported team members in the process, but not both. **District coaches**: Either reminded team members to upload current files or supported team members in the process, but not both.	**Presenters**: Reminded team members to upload current files to the document storage platform and offered assistance in this process. **District coaches**: Reminded team members to upload current files to the document storage platform and offered assistance in this process (score 2 if coach did not offer

	0 – Not Implemented/ No	1 – Partially Implemented/ Partially	2 – Fully Implemented/ Yes
			assistance because team members were proficient at using platform – after session 2)
17. Session ended on time (2 – on time; 1 – within 15 min of end time late or within 30 min of end time early; 0 = more than 15 min late ending or more than 30 min early) **(See PS)**	**Presenters**: Ended more than 15 minutes late or early of ending time.	**Presenters**: Ended within 15 minutes of ending time.	**Presenters**: Ended presentation on time.
18. Participants remained engaged and present until the end of the session. ___total present at end ___total who left prior to end (score 2 if 5% or fewer left early)	**District coaches**: At least 80% of coaches left early. **Team members**: At least 80% left early.	**District coaches**: Less than 80% remained until the end of the session and engaged by participating in activities, keeping electronic devices stored away unless needed for presentation activities, and contributing to presentation topic discussions. **Team members**: Less than 80% remained until the end of the session and engaged by participating in activities, keeping electronic devices stored away unless needed for presentation activities, and contributing to presentation topic discussions.	**District coaches**: At least, 80% remained until the end of the session and engaged by participating in activities, keeping electronic devices stored away unless needed for presentation activities, and contributing to presentation topic discussions. **Team members**: At least 80%, remained until the end of the session and engaged by participating in activities, keeping electronic devices stored away unless needed for presentation activities, and contributing to presentation topic discussions.

Notes:			

FABI Key Terms

1. **A-B-C data collection**
   a. A method of data collection that involves recording the antecedents that precede the target behavior and the consequences that follow.
2. **Acquisition deficit**
   a. Student does not perform the behavior because the behavior has not yet been learned (e.g., can't do problem).
3. **Antecedent adjustments**
   a. Modifications in contextual or instructional environment to elicit the replacement behavior.
4. **Extinction**
   a. Withholding the consequences that previously reinforced the target (undesired) behavior.
5. **Functional assessment-based intervention**
   a. An intervention designed based on the reason why the target (undesirable) behavior is occurring.
   b. ARE components: antecedent adjustments, adjustment in reinforcement rates, and extinction of the target behavior. Functional assessment interview
6. **Functional assessment interview**
   a. Formal, structured, interviews with key stakeholders to determine the reasons why a given behavior occurs (e.g., teacher, parent, staff, student).
7. **Function matrix**
   a. A visual tool for organizing and analyzing functional assessment data.
   b. Specifically, the Function Matrix is a 3 x 2 grid containing six cells along two dimensions: These are (a) **sources of reinforcement: attention, tangibles/activities**, and **sensory stimulation**; and (b) **type of reinforcement involved: positive reinforcement (access something)** and **negative reinforcement (avoid something)**.
8. **Generalization and maintenance**
   a. Generalization assesses the degree to which the new behavior is observed in other settings and with other people
   b. Maintenance is the degree to which the new behavior is maintained over time.
9. **Momentary time sampling**
   a. A measurement system in which the presence/absence of behavior(s) are recorded at specified time intervals.
   b. Divide an observation window into equal intervals (e.g., 2 min). At each time point, mark whether the behavior is or is not occurring at that moment.
10. **Operational definitions of behavior**
    a. Includes a *label* for the behavior, a *definition* of the behavior, *examples* of behavior, and *non-examples* of behavior
    b. Example: Off-task behavior refers to attending to activities in class other than assigned assignments. Examples include playing with materials inappropriately, talking to peers, and drawing. Non-examples include working on assigned assignment, using assigned materials, and following directions.
11. **Performance deficit**
    a. Student is capable of performing the target behavior but elects not to (Motivational issues; Won't do)
12. **Positive reinforcement**
    a. The contingent introduction of a stimuli that increase the future probability of a behavior occurring.
    b. Example: Calling on a student who raises his hand in order to increase the probability of hand-raising in the future.
13. **Replacement behavior**
    a. A functionally equivalent behavior taught to replace a target (undesired) behavior.
    b. A socially valid behavior specifically selected and operationally defined to replace a target (undesired) behavior.
14. **Social Validity**
    a. Social significance of the goals; Social acceptability of the treatment procedures; social importance of the effects.
    b. The stakeholders' views of the goals, procedures, and outcomes of the intervention; can also predict the degree of implementation
15. **Treatment Integrity**
    a. The extent to which the intervention plan is implemented as designed.

Oakes, W. P., Lane, K. L., et al. (2014). Functional Assessment-based Intervention (FABI) Professional Learning Series Procedural Fidelity Observation Tool. *Unpublished Tool*

Appendix 12.
Demographic Form

Building Capacity for Functional Assessment-Based Intervention's (FABI) in [redacted] ***A Professional Development Training Series* (FABI in** [redacted]
Demographic Form RETURN TO UNIVERSITY OF KANSAS

ID Number: ________________ Cohort: ___ A ___B ____ C

1. *What is your sex?*
❑ Male ❑ Female

2. What is your age (as of your last birthday)? __________

3. Please check all categories that best describe your race/ethnicity:

❑ American Indian/Alaska Native
❑ Asian/Pacific Islander
❑ Black, not Hispanic
❑ Hispanic
❑ White, not Hispanic
❑ Other (specify):____________________
❑ Decline

4. If you are a school employee,
- how many years have you worked in education (including this year): ________
- how many years have you worked at your current school level [early childhood, elementary, middle, high school] (including this year): ____________
- Please indicate the grade(s) you currently teach (choose all that apply):
Early Childhood__, PreK__,K__, 1__, 2__, 3__, 4__,5__, 6__, 7__, 8__, 9__, 10__, 11__, 12__,
Mixed grade class__ (please specify) _____________

5. I am a:

❑ General Educator
❑ Special Educator, setting ____________
❑ Administrator
❑ Related Service Provider, please specify:
____
❑ Staff, please specify: _______________
❑ Parent Member on the FABI Team

6. If you are a teacher, are you certified in the areas/subjects you currently teach?

❑ No
❑ Yes

If you are a Parent Member on the FABI Team, do you work outside the home?
❑ No
❑ Yes
If yes, what is your job?
____

7. What is the highest degree you have earned:

❑ High school diploma
❑ Associate's degree / Technical
❑ Bachelor's degree
❑ Master's degree
❑ Master's degree +30
❑ Doctoral, Educational Specialist, J.D. degree
❑ Not applicable

What was your major area of study (highest degree only):
____

8. Have you had a course in

classroom management?
❑ No
❑ Yes

Functional behavioral assessment?
❑ No
❑ Yes

9. Have you had a professional development or other training in

Academic screenings?
❑ No
❑ Yes

Behavior screenings?
❑ No
❑ Yes

Appendix 13.

Professional Learning Series Outcome Measures

Measure	Purpose	Description
FABI Professional learning series procedural fidelity	To measure the degree to which implementers implemented and participated in professional learning procedures as intended.	18-item procedural integrity checklist monitoring presenters, district coaches, and team members' implementation of professional learning and its associated activities within sessions. Presenters/ District Coaches were rated on a 3-point Likert-type scale: 2 = *Fully implemented*, 1 = *Partially implemented*, 0 = *Not implemented*. FABI Teams were also rated on a 3-point Likert-type scale: 2 = *Yes*, 1 = *Partially*, 0 = *No*. Total points possible ranged from 0-22 (presenters), 0-16 (district coaches), 0-22 (trainee). Percentages were calculated by summing points awarded and dividing by total points possible based on items scored and multiplied by 100.
Attendance.	To measure the district coaches and trainees exposure (training dosage) to professional learning series.	Attendance was collected in twice each Day AM and PM of each session. Attendance was scored each day as follows: 0 (*absent in AM and PM*), 1 (*present in either the AM or PM* only) or 2 (*present in both AM and PM*). Total attendance was summed, with possible scores ranging from 0-10.
Demographic	To measure the dimensions and dynamics of the sample and explore key demographic variables as predictors in regression models examining professional learning outcomes.	This measure included items related to participants' demographic information. It included nine items: (1) gender (binary coding, 0 = female, 1 = male), (2) age, (3) race/ethnicity (categorical and dummy coded), (4) years experience, (5) role (categorical and dummy coded), (6) certification status (binary coding, 0 = not licensed for current position, 1 = licensed for current position), (7) highest level of education, (8) course work experience classroom management and functional behavior assessment (binary coding, 0 = no, 1 = yes) and (9) professional development experience in academic screening and behavior screening (binary coding, 0 = no, 1 = yes). Role (including whether teacher of supported student), years experience to field, degree, and age were included as possible predictors across all regression models.

Measure	Purpose	Description
FABI Formative assessment.	To assess trainees' knowledge and the start and end of each training session to monitor learners' comprehension, learning needs, and content progress within each session.	10-item multiple choice questions (50 total) with four possible answers, with one correct answer were presented at the start and end of each day and covered a range of topics specific to learning objectives and training materials specific to each training day. A daily formative assessment pre and post-session score was computed by summing total questions correct. Percentages were calculcated by summing total correct and dividing by ten for pre session and post session scores. Differences were calculated by subtracting pre session from post session (post – pre). Difference scores were used as primary analysis (to explore growth) across regression models, with secondary analysis using post score with pre as a covariate (to see where people ended up).

Measure	Purpose	Description
Knowledge, confidence, and use (KCU) FABI Survey	To assess gains in educators' knowledge, confidence, and use in 15 concepts and strategies constituting the process of designing, implementing, and evaluating FABIs taught in the professional development training series.	15-item KCU survey related to concepts and strategies related to FABI. Perceived ratings were completed using a 4-point Likert Type scale (e.g., 0 = *I have no knowledge of this concept or strategy*, 1= *I have some knowledge of this concept or strategy*, 2 = *I have more than average knowledge of this concept or strategy*, and 3 = *I have a substantial amount of knowledge about this concept or strategy*). Actual knowledge was rated using 15-item multiple choice test, where each question had one correct answer (*3 points*) and three distractor answers weighted as follows: partially accurate answer, with no inaccurate information (*2 points*); partial accurate answer, with some inaccurate information (*1 point*); incorrect answer, with no accurate information (*0 points*). Four constructs were constructed at each time point: percieved knowledge, percieved confidence, percieved usefulness, and actual knowledge. Pre and post training scores were computed by summing the points for each item (range 0-15). Percentage scores were also computed by dividing the total points indicated, by the total points possible and multiplying by 100 (range: 0 to 100%. Across constructs, higher scores indicated greater levels of knowledge, confidence, and usefulness. Addiotnally, difference scores were calculated by subtracting pre session from post session (post – pre). Difference scores were used as primary analysis (to explore growth) across regression models, with secondary analysis using post score with pre as a covariate (to see where people ended up).
FABI: Step completion	To document step completion and monitor team's progress in how far (completion) teams progressed across each step in supporting an actual student.	57 item measure related to 5-step FABI process. Each item was scored on a 4-point Likert type scale: 0 = *Item not completed*, 1 = *Item partially completed, less than half*, 2 = *Item partially completed, at least half or greater*, 3 = *Item completed*. Percent completion for each step was calculated by summing the total points earned using the Likert-type scale with the total points possible for each step and multiplying the quantity by 100.
Step 1		Step 1 (3 items)
Step 2		Step 2 (13 items)

Measure	Purpose	Description
Step 3		Step 3 (12-items)
Step 4		Step 4 (10-items; 1 item removed from analysis [prepare intervention materials])
Step 5		Step 5 (19 items)
FABI: Step Quality	To document step quality and monitor team's progress in how well (quality) teams progressed across each step in supporting an actual student.	57 item measure related to 5-step FABI process. Each item was scored on a 4-point Likert type scale: 0 = *No knowledge/accuracy*, 1 = *Partially accurate knowledge, but inaccurate information included*, 2 = *Partially accurate knowledge, with no inaccurate information included*, 3 = *All provided information correct*. Percentquality for each step was calculated by summing the total points earned using the Likert-type scale with the total points possible for each step and multiplying the quantity by 100.
Step 1		Step 1 (3 items)
Step 2		Step 2 (13 items)
Step 3		Step 3 (12-items)
Step 4		Step 4 (10-items;1 item removed from analysis [prepare intervention materials])
Step 5		Step 5 (19 items)
Functional Relation	To document extent to which teams demonstrated a functional relation between the introduction of the independent variable and changes in student performance.	Student graph depicting A-B-A-B design of student centered FABI intervention was evaluating using level, trend, and stability within- and across-conditions to determine the extent which a functional relation was established.

Note: FABI = funcitonal assessment-based intervention; KCU = *Knowledge, Confidence, and Use Survey*

Appendix 14.
Measure: Formative Assessments

2014 KU [redacted] FABI Training

6. "A teacher hands out a math computation worksheet, starts the timer, and tells students they will be timed in completing the math worksheet. One student then tears up the worksheet. *The teacher scolds the student and has the student clean up the mess without completing the worksheet*." The italicized sentence is an example of:
   a. Antecedent
   b. Consequence
   c. Negative Reinforcement
   d. Antecedent Adjustment

7. ________________ includes the context for which the behavior occurs and specific events immediately preceding the behavior.
   a. Antecedent
   b. Consequence
   c. Behavior
   d. Distal setting event

8. The __________________ help(s) to visually identify the function of the behavior.
   a. function-based intervention decision model
   b. graphing of A-B-C data
   c. function matrix
   d. ARE components

9. When conducting school-based functional behavior assessment interviews, it is important to begin with
   a. the student interview.
   b. the parent interview.
   c. the teacher interview.
   d. the principal interview.

10. Identify the best example of an operational definition of behavior:
   a. Jimmy is very immature.
   b. Susie really has a hang-up.
   c. John has a red face and perspires when angry.
   d. Sam becomes very angry in emotionally charged situations.

2014 KU [redacted] FABI Training

Formative Assessment Day 2

Directions: Read each question or statement carefully. Select the best answer. There is only one answer per question.

1. Select the statement that best describes *baseline*:
   a. A screening procedure occurring at three time points each year to monitor risk.
   b. The primary prevention efforts all students in a school receive.
   c. Current levels of behavior before intervention begins.
   d. Using data from measures that are sensitive to change to determine which students need additional instruction or supports to meet expectations.

2. What is the correct sequence of events for conducting a functional assessment?
   a. Rating scales, interviews, A-B-C data collection, records review, identify the function.
   b. Records review, interviews, rating scales, A-B-C data collection, identify the function.
   c. A-B-C data collection, interviews, rating scales, records review, identify the function.
   d. Interviews, rating scales, A-B-C data collection, records review, identify the function.

3. How many functions of behavior are there?
   a. Two: positive reinforcement (access something) and negative reinforcement (avoid something).
   b. Two: reinforcement (increase the likelihood of a behavior occurring) and punishment (decrease the likelihood of a behavior occurring).
   c. Three: attention, tangibles/activities, sensory.
   d. Two: power, control.

4. Which of the following is NOT a dimension of behavior?
   a. Frequency
   b. Intensity
   c. Duration
   d. A-B-C

2014 KU [redacted] FABI Training

Formative Assessment Day 1

Directions: Read each question or statement carefully. Select the best answer. There is only one answer per question.

1. A systematic approach to functional assessment-based interventions includes all of the following except:
    a. Function Matrix
    b. Punishment
    c. Function-based intervention decision model
    d. ARE Components

2. Which of the following best matches the definition, "Attending to activities in class other than assignments"?
    a. A non-example of off-task behavior
    b. An example of off-task behavior
    c. A non-example of laziness
    d. An example of laziness

3. Which of the following is NOT an example of informal information gathering?
    a. Draw a classroom map
    b. Obtain a copy of the Tier 1 PBIS plan
    c. A-B-C Data Collection
    d. Obtain a copy of the instructional schedule

4. Which of the following functional assessment interview forms are matched with the correct population?
    a. Preliminary Functional Assessment Interview for teacher and parent
    b. Family Functional Assessment Interview for parent and student
    c. Student Functional Assessment Interview for student
    d. Adult Function Assessment Interview for teacher and parent
    e. A and C
    f. C and D

5. __________________ offer(s) a standardized measure of social skills, competing problem behaviors, and academic competence.
    a. Social Skills Improvement System - Rating scale
    b. Academic screeners (e.g., AIMSweb)
    c. Behavior screeners (e.g., Student Risk Screening Scale)
    d. Social validity

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5. Which of the following is NOT true about A-B-C data collection?
    a. A-B-C data collection is a methodology grounded in applied behavior analysis.
    b. A-B-C data collection is used to calculate baseline level.
    c. A-B-C data collection is a specific type of direct observation.
    d. A-B-C data collection is used to inform function.

6. Momentary time sampling is a measurement system ideal for recording behaviors under which of the following conditions?
    a. Discrete or continuous behaviors.
    b. Behaviors occurring at moderate frequency.
    c. Behaviors that occur infrequently.
    d. A and B

7. The purpose of the Function Matrix is to
    a. analyze data collected using functional assessment procedures.
    b. assist in developing a hypothesis statement regarding the target behavior.
    c. Both A and B
    d. Neither A nor B

8. If the consequence makes the behavior ________________, the consequence is called a reinforcer.
    a. less likely to occur
    b. more likely to occur
    c. burst in the future
    d. continue unchanged

9. _________________ dimensions of behavior can be measured using event recording, interval recording, and time sampling.
    a. Numerical
    b. Nonuniform
    c. Temporal
    d. Functional

10. _________________ dimensions of behavior can be measured using latency recording and duration recording.
    a. Numerical
    b. Uniform
    c. Temporal
    d. Functional

6. Select the statement that best describes *interobserver agreement*:
   a. The stakeholders' views of the goals, procedures, and outcomes of the intervention.
   b. The degree to which the intervention is implemented as designed.
   c. The degree to which two observers are observing the same behavior during an observation time period.
   d. The degree to which two measures of constructs theoretically related are, in fact, related.

7. __________________ is the degree to which the intervention components are implemented as designed.
   a. Interobserver agreement
   b. Treatment integrity
   c. Generalization
   d. Social validity

8. __________________ data are used to asses stakeholders' views regarding the goals, procedures, and intended outcomes of an intervention.
   a. Academic screening
   b. Social validity
   c. Behavior screening
   d. Treatment integrity

9. Sally's target behavior is grabbing toys (function: positive reinforcement-access tangibles). The FABI team has selected asking to play with the toy as a possible replacement behavior. Sally uses a nonverbal communication system to request toy items with adults, but has not generalized this to making requests with her peers. The team has decided the classroom does represent effective practices, but Sally has not learned the replacement behavior. Method 1: Teach the replacement behavior is the appropriate intervention for Sally's FABI.
   a. True
   b. False

10. Which of the following is **not** a question one would ask when selecting an intervention method using the Function-Based Intervention Decision Model
    a. Is the teacher willing to modify his or her classroom?
    b. Can the student perform the replacement behavior?
    c. Do antecedent conditions represent effective practices?
    d. None, all of these questions are included in the Function-Based Intervention Decision Model

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Formative Assessment Day 3

Directions: Read each question or statement carefully. Select the best answer. There is only one answer per question.

1. An acquisition deficit means the student __________ the behavior, whereas a performance deficit means the student __________ the behavior.
    a. can't do; won't do
    b. won't do; can't do
    c. likes; does not like
    d. shows; does not show

2. Self-monitoring is NOT desirable for students
    a. with performance deficits.
    b. with acquisition deficits.
    c. with time management issues.
    d. with performance and acquisition deficits.

3. Hypothesized function statements ideally would include information pertaining to
    a. the antecedent and the student.
    b. the target behavior and the function(s) of the behavior.
    c. any brief additional information that may aid the understanding of the statement.
    d. A, B, and C

4. Mrs. Swanson is working with a behavior specialist to create a FABI targeting Benedict's off-task behavior during science class, which include behaviors such as rearranging materials in the lab closet, digging in a backpack, and fooling around with lab equipment. Mrs. Swanson proposes the possible replacement behavior of Benedict getting a grade of "A" in science class. Which of the following statements best justifies why this is not a good replacement behavior?
    a. No error, this is an ideal replacement behavior.
    b. The replacement behavior is an outcome or product of behavior.
    c. The replacement behavior describes the absence of behavior.
    d. The replacement behavior does not pass the dead man test.

5. The _______________ behavior is an adaptive behavior to replace the target behavior. The intervention targets the learning of the ______________ behavior.
    a. replacement; target
    b. replacement; replacement
    c. target; replacement
    d. operational; target

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Formative Assessment Day 4

Directions: Read each question or statement carefully. Select the best answer. There is only one answer per question.

1. ___________________ is the degree to which the new behavior is observed in other settings and/or with other people.
   a. Social validity
   b. Generalization
   c. Treatment integrity
   d. Maintenance

2. Which of the following is not a measure of the social validity?
   a. The social significance of the target behavior.
   b. The acceptability of the procedures.
   c. The magnitude of behavior change.
   d. The social importance of the results.

3. Obtaining informed consent, maintaining total confidentiality, and maintaining detailed documentation of your work are examples of ___________________.
   a. ethical considerations
   b. treatment integrity
   c. experimental design
   d. internal validity
   e. All of the above.

4. Which of the following is a reason to graph your data?
   a. Provides a means of organizing data.
   b. Provides an ongoing picture to determine the effectiveness of an intervention.
   c. Facilitates communication amongst parents, students, teachers, and others.
   d. All of the above.

5. Which of the following is not an example of data one would use to analyze if the intervention is working?
   a. Mean and slope comparisons
   b. Stability
   c. Level
   d. Trend
   e. None: all could be used to support whether or not the intervention is working.

6. Which of the following types of behavior recording cannot be converted to graphic representation?
    a. Permanent product recording
    b. A-B-C data collection
    c. Event recording
    d. Duration recording

7. Which experimental design is encouraged when testing the intervention?
    a. Randomized control trial
    b. A-B-A-B design
    c. A-B-C design
    d. A-B design

8. When graphing data in single-subject designs, one should always add a line to separate phases and ______ connect data points between phases.
    a. never
    b. always
    c. partially
    d. sometimes

9. Changing criterion designs are ideal experimental design for which intervention method?
    a. Method 1: Teach the behavior
    b. Method 2: Improve the environment
    c. Method 3: Adjust the contingencies
    d. Never

10. When selecting A-R-E components, it is important to link said components to the hypothesized function.
    a. True
    b. False

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Formative Assessment Day 5

Directions: Read each question or statement carefully. Select the best answer. There is only one answer per question.

1. Comprehensive, integrated, three-tiered (CI3T) models of prevention:
    a. Address students' academic, behavioral, and social needs in an integrated fashion through three tiers of increasing intensity: primary, secondary, and tertiary.
    b. Meet students' academic and behavior needs and provide support for students needing more in either of these domains through three tiers: primary, moderate, and intensive.
    c. Address students' academic, behavioral, and emotional development needs through three tiers: low, medium, and high.
    d. Meet the learning needs of students in general education and provide support for students who need additional instruction through special education services.

2. Tertiary prevention
    a. Supports at the top of the CI3T triangle reserved for students with the most intensive needs. Examples include functional assessment-based interventions and one-on-one counseling.
    b. Supports only for students who are receiving special education services.
    c. Supports requiring the least amount of resources. Examples of tertiary interventions include check in-check out and providing a student more opportunities to respond.
    d. A and B

3. Systematic behavior screening
    a. A procedure occurring at three time points each year to monitor risk: fall, winter, and spring. All students who have been present in school for at least four to six weeks prior to the screening time point are screened.
    b. A procedure occurring at three time points each year to monitor risk: fall, winter, and spring. Screening data definitively tell schools whether a child needs special education.
    c. A procedure occurring in the fall and spring. All students are to be screened no matter how long they have been in attendance.
    d. A procedure occurring at three time points throughout the year: fall, winter, and spring. Only students whom a teacher thinks could benefit from secondary and/or tertiary supports are to be screened.

4. A functional relation between intervention and student outcomes can be determined even if treatment integrity data is low or not collected.
    a. True
    b. False

5. When selecting a target behavior, it is important to choose a behavior ____________ in the acting out cycle.
    a. early
    b. in the middle
    c. late
    d. not

6. Target and replacement behaviors should include all of the following components *except*:
    a. Label of behavior
    b. Operational definition of behavior
    c. Examples of behavior
    d. Non-examples of behavior
    e. All of the above should be included

7. In a classic A-B-C three-term contingency, reinforcement and punishment most often occur during the ________________.
    a. establishing operation
    b. antecedent
    c. behavior
    d. consequence

8. Obtaining informed consent, maintaining total confidentiality, and maintaining detailed documentation of your work are examples of _____________.
    a. ethical considerations
    b. treatment Integrity
    c. experimental design
    d. internal validity
    e. All of the above.

9. Which experimental design is encouraged when testing the intervention:
    a. Randomized control trial
    b. A-B-A-B design
    c. A-B design
    d. A-B-C design
    e. A-B-C-B design

10. Select the statement that best describes *interobserver agreement*:
    a. The stakeholders' views of the goals, procedures, and outcomes of the intervention.
    b. The degree to which the intervention is implemented as designed.
    c. The degree to which two observers are observing the same behavior during an observation time period.
    d. The degree to which two measures of constructs theoretically related are, in fact, related.

Appendix 15.
Measure: Knowledge, Confidence and Use Survey

Knowledge, Confidence and Use Survey
Building Capacity for Functional Assessment-Based Interventions (FABI) in [redacted]

Name: ________________________ **ID Number:** ____________________________

District: ________________________ **School:** ____________________________

Time Point: ☐ Pre-Training Survey ☐ Post-Training Survey ☐ Follow Up Survey

Please rate the concepts and strategies listed below using the criteria provided. Decide how knowledgeable you are about each concept or strategy. Then rate how confident you are in your ability to use or implement each concept or strategy. Finally, rate how useful each concept or strategy is for you.

Knowledge:
0 – I have no knowledge of this concept or strategy.
1 – I have some knowledge of this concept or strategy.
2 – I have more than average knowledge of this concept or strategy.
3 – I have a substantial amount of knowledge about this concept or strategy.

Confidence:
0 – I am not confident in my ability to use or implement this concept or strategy.
1 – I am somewhat confident in my ability to use or implement this concept or strategy.
2 – I am more confident than most in my ability to use or implement this concept or strategy.
3 – I am very confident in my ability to use or implement this concept or strategy.

Useful:
0 – I do not view this concept or strategy as useful and/or relevant in my teaching.
1 – I view this concept or strategy as somewhat useful and/or relevant in my teaching.
2 – I view this concept or strategy as more useful than most other concepts or strategies.
3 – I view this concept or strategy as highly useful and/or relevant in my teaching

Concept	**Knowledge**	**Confidence**	**Useful**
1. Performance deficit	0 1 2 3	0 1 2 3	0 1 2 3
2. Function matrix	0 1 2 3	0 1 2 3	0 1 2 3
3. Functional assessment-based intervention	0 1 2 3	0 1 2 3	0 1 2 3
4. Functional assessment interview	0 1 2 3	0 1 2 3	0 1 2 3
5. Social Validity	0 1 2 3	0 1 2 3	0 1 2 3
6. Operational definitions of behavior	0 1 2 3	0 1 2 3	0 1 2 3
7. Positive reinforcement	0 1 2 3	0 1 2 3	0 1 2 3
8. Replacement behavior	0 1 2 3	0 1 2 3	0 1 2 3
9. Acquisition deficit	0 1 2 3	0 1 2 3	0 1 2 3
10. A-B-C data collection	0 1 2 3	0 1 2 3	0 1 2 3
11. Antecedent adjustments	0 1 2 3	0 1 2 3	0 1 2 3
12. Extinction	0 1 2 3	0 1 2 3	0 1 2 3
13. Generalization and maintenance	0 1 2 3	0 1 2 3	0 1 2 3
14. Momentary time sampling	0 1 2 3	0 1 2 3	0 1 2 3
15. Treatment Integrity	0 1 2 3	0 1 2 3	0 1 2 3

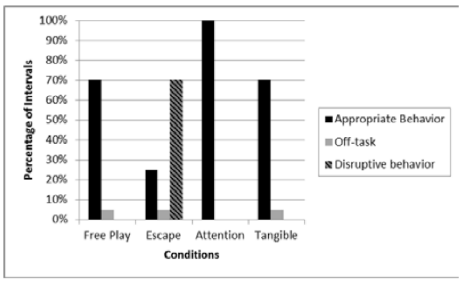
Multiple Choice: Circle the most correct answer

Directions: Please read each question carefully; select the statement that best answers the question. There is only one correct answer per question.

1. Select the statement that best describes the term: *performance deficit.*
    a. Student does not perform the behavior. [2 points]
    b. Student is capable of performing the behavior but elects not to (e.g., won't do problem). [3 points]
    c. Student is capable of performing the behavior but needs additional teaching to learn the skill (e.g., can't do problem). [1 point]
    d. Student receives and processes information differently. [0 points]

2. Select the image that best represents the term: *function matrix.*

a. [0 points]



b. [3 points]

	Positive Reinforcement (Access something)	Negative Reinforcement (Avoid something)
Attention		
Tangibles/ activities		
Sensory		

c. [1 point]

	Antecedent	Behavior	Consequence
Attention			
Tangibles/ activities			
Sensory			

d. [2 points]

	Positive Reinforcement	Negative Reinforcement
Attention		
Tangibles		

3. Select the statement that best describes the term: *functional assessment-based intervention.*
    a. An intervention based on why the target (undesirable) behavior is occurring, and includes the following ARE components: antecedent adjustments, adjustment in reinforcement rates, and extinction of the target behavior. [3 points]
    b. An intervention which includes ARE components: antecedents, reinforcement, and extinction. [2 points]
    c. An intervention to address a target behavior provided only by someone with special training such as a school psychologist, licensed mental health practitioner, and/or certified behavior analyst. [1 point]
    d. A tool for organizing and analyzing student behavioral observations and data. [0 points]

4. Select the statement that best describes the term: *functional assessment interviews.*
    a. Formal, structured, interviews with key stakeholders to determine the reasons why a given behavior occurs (e.g., teacher, parent, staff, student). [3 points]
    b. Formal interviews with teachers to determine why a given behavior occurs. [2 points]
    c. Informal interviews with the target student and his or her peers to gather initial information about the target behavior from the students' perspective. [1 point]
    d. The stakeholders' views of the goals, procedures, and outcomes of the intervention. [0 points]

5. Select the statement that is most true of the term: *social validity.*
    a. The stakeholders' opinions of the intervention procedures. [2 points]
    b. IDEA's position on the goals, procedures, and outcomes of the intervention as an appropriate school-based intervention. [1 point]
    c. Extent to which the intervention is implemented as designed. [0 points]
    d. The stakeholders' views of the goals, procedures, and outcomes of the intervention; can also predict the degree of implementation. [3 points]

6. Select the best illustration of an *operational definition of behavior.*
    a. Disruptive behavior includes talking out of turn, pushing peers, wandering around classroom during instruction. Non-examples of disruptive behavior include working on assigned tasks, talking to peers on topic, and raising hand. [2 points]
    b. Off-task behavior refers to attending to activities in class other than assigned assignments. Examples include playing with materials inappropriately, talking to peers, and drawing. Non-examples include working on assigned assignment, using assigned materials, and following directions. [3 points]
    c. Destruction of classroom property behavior refers to making staff members angry and irritated by ruining classroom materials, which includes behaviors such as drawing in books, tearing up worksheets, and smashing materials. Non-examples include: hand flapping, pushing peers in line, and working on assignments. [1 point]
    d. Any behavior that passes the criteria of the Dead Man's Rule. [0 points]

7. Select the scenario that best describes the term: *positive reinforcement.*
    a. Providing attention when a student raises their hand to answer a question [2 points]
    b. Calling on a student who raises his hand in order to increase the probability of hand-raising in the future. [3 points]
    c. Sending student to nurse's office to visit when he/she complains of ailments during non-preferred activities increasing the probability of future complaints. [1 point]
    d. Using a strategy such as precorrection to prevent a behavior from reoccurring. [0 points]

8. Select the statement that best describes the term: *replacement behavior.*
    a. Any behavior taught other than the target (undesired) behavior. [1 point]
    b. A more socially acceptable behavior than the target (undesired) behavior. [2 points]
    c. A socially valid behavior specifically selected and operationally defined to replace a target (undesired) behavior. [3 points]
    d. Behaviors that will prevent the display of the target (undesired) behavior. [0 points]

9. Select the scenario that best describes a student with an *acquisition deficit.*
    a. Student has a learning disability where he or she receives and processes information differently. [0 points]
    b. Student has not learned the behavior because he or she is not motivated (e.g., won't do problem) to learn. [1 point]
    c. Student has not learned the behavior. [2 points]
    d. Student does not perform the behavior because the behavior has not yet been learned (e.g., can't do problem). [3 points]

10. Select the statement that best describes the term: *A-B-C data collection.*
    a. A method of data collection that involves recording the antecedent events that precede the behavior, the behavior, and the consequences that follow. [3 points]
    b. Antecedent – Behavior – Consequence. [2 points]
    c. A method of data collection that involves recording the antecedent, the behavior, and the consequence to determine baseline levels of performance. [1 point]
    d. A visual tool for organizing and analyzing collected A-B-C data. [0 points]

11. Select the statement that best describes the term: *antecedent adjustments.*
    a. Modifications in a setting's contextual or instructional environment after the replacement behavior is performed. [1 point]
    b. Changing the contextual or instructional environment. [2 points]
    c. Modifications in contextual or instructional environment to elicit the replacement behavior. [3 points]
    d. A visual tool for organizing and analyzing antecedent variables gathered during A-B-C data collection. [0 points]

12. Select the statement that best describes the term: *extinction.*
    a. Withholding the consequences that previously reinforced the replacement behavior. [1 point]
    b. Withholding the consequences that previously reinforced the target (undesired) behavior. [3 points]
    c. Modifications in the contextual or instructional environment. [0 points]
    d. Withholding consequences after the target behavior. [2 points]

13. Select the statement that best describes the term: *generalization and/or maintenance.*
    a. Generalization assesses the degree to which the target behavior is observed in other students and with other people who were not a part of the intervention. [1 point]
    b. The stakeholders' views of the goals, procedures, and outcomes of the intervention. Social importance of the effects. [0 points]
    c. Generalization and maintenance assess the degree to which a new behavior is maintained over time across different people. [2 points]
    d. Generalization assesses the degree to which the new behavior is observed in other settings and with other people; maintenance is the degree to which the new behavior is maintained over time. [3 points]

14. Select the directions that best describe the term: *momentary time sampling.*
    a. At each observation of the target behavior, record the antecedent, behavior, and consequence. [0 points]
    b. Divide an observation window into equal intervals (e.g., 2 min). At the end of each time point, mark if the behavior was occurring or just occurred (immediately prior). [1 point]
    c. Divide an observation window into equal intervals (e.g., 2 min). At each time point, mark whether the behavior is or is not occurring at that moment. [3 points]
    d. When cued, mark whether the behavior is or is not occurring. [2 points]

15. Select the statement that best describes the term: *treatment integrity.*
    a. The extent to which the intervention plan is implemented as designed. [3 points]
    b. The implementation of the intervention phase in a single case design experiment. [0 points]
    c. The implementation of the intervention. [2 points]
    d. The extent to which the intervention plan is implemented in alignment with the function of the target behavior. [1 points]

Appendix 16

Cronbach Coefficient Alpha, Descriptive Statistics, Perceived Knowledge, Confidence, and Use Constructs

	Pre					Post				
	n (% Miss.)	Raw Variables		Standardized Variables		n (% Miss.)	Raw Variables		Standardized Variables	
		Correlation with Total	α	Correlation with Total	α		Correlation with Total	α	Correlation with Total	α
Knowledge (perceived)										
Performance deficit	297 (13%)	0.70	0.95	0.71	0.95	281 (18%)	0.67	0.93	0.67	0.93
Function Matrix	297 (13%)	0.53	0.95	0.53	0.95	281 (18%)	0.65	0.93	0.65	0.93
Functional assessment-based intervention	297 (13%)	0.81	0.95	0.81	0.94	281 (18%)	0.70	0.93	0.70	0.93
Functional assessment interviews	297 (13%)	0.8	0.95	0.8	0.94	281 (18%)	0.69	0.93	0.69	0.93
Social Validity	297 (13%)	0.63	0.95	0.63	0.95	281 (18%)	0.68	0.93	0.68	0.93
Operational Definition of behavior	297 (13%)	0.84	0.94	0.84	0.94	281 (18%)	0.69	0.93	0.69	0.93
Positive Reinforcement	297 (13%)	0.52	0.95	0.52	0.95	281 (18%)	0.68	0.93	0.68	0.93
Replacement Behavior	297 (13%)	0.71	0.95	0.71	0.95	281 (18%)	0.68	0.93	0.69	0.93
Acquisition Deficit	297 (13%)	0.7	0.95	0.7	0.95	281 (18%)	0.65	0.93	0.65	0.93
ABC data collection	297 (13%)	0.72	0.95	0.71	0.95	281 (18%)	0.65	0.93	0.65	0.93
Antecedent Adjustment	297 (13%)	0.73	0.95	0.73	0.95	281 (18%)	0.68	0.93	0.68	0.93
Extinction	297 (13%)	0.75	0.95	0.74	0.95	281 (18%)	0.7	0.93	0.71	0.93

	Pre					Post				
	n (% Miss.)	Raw Variables		Standardized Variables		n (% Miss.)	Raw Variables		Standardized Variables	
		Correlation with Total	α	Correlation with Total	α		Correlation with Total	α	Correlation with Total	α
Generalization and maintenance	297 (13%)	0.83	0.94	0.83	0.94	281 (18%)	0.65	0.93	0.65	0.93
Momentary time sampling	297 (13%)	0.84	0.94	0.83	0.94	281 (18%)	0.67	0.93	0.66	0.93
Treatment integrity	297 (13%)	0.8	0.95	0.8	0.94	281 (18%)	0.74	0.93	0.74	0.93
Knowledge (perceived) α		0.95		0.95			0.94		0.94	
Confidence										
Performance deficit	273 (20%)	0.74	0.95	0.74	0.95	276 (19%)	0.64	0.93	0.64	0.93
Function Matrix	273 (20%)	0.60	0.95	0.61	0.95	276 (19%)	0.62	0.93	0.62	0.93
Functional assessment-based intervention	273 (20%)	0.84	0.95	0.84	0.95	276 (19%)	0.69	0.93	0.69	0.93
Functional assessment interviews	273 (20%)	0.83	0.95	0.83	0.95	276 (19%)	0.67	0.93	0.67	0.93
Social Validity	273 (20%)	0.63	0.95	0.64	0.95	276 (19%)	0.73	0.93	0.73	0.93
Operational Definition of behavior	273 (20%)	0.84	0.95	0.83	0.95	276 (19%)	0.70	0.93	0.70	0.93
Positive Reinforcement	273 (20%)	0.55	0.96	0.54	0.96	276 (19%)	0.62	0.93	0.62	0.93
Replacement Behavior	273 (20%)	0.67	0.95	0.67	0.95	276 (19%)	0.65	0.93	0.65	0.93
Acquisition Deficit	273 (20%)	0.73	0.95	0.73	0.95	276 (19%)	0.64	0.93	0.64	0.93

	Pre					Post				
	n (% Miss.)	Raw Variables		Standardized Variables		n (% Miss.)	Raw Variables		Standardized Variables	
		Correlation with Total	α	Correlation with Total	α		Correlation with Total	α	Correlation with Total	α
ABC data collection	273 (20%)	0.75	0.95	0.75	0.95	276 (19%)	0.64	0.93	0.64	0.93
Antecedent Adjustment	273 (20%)	0.74	0.95	0.74	0.95	276 (19%)	0.7	0.93	0.7	0.93
Extinction	273 (20%)	0.78	0.95	0.77	0.95	276 (19%)	0.67	0.93	0.67	0.93
Generalization and maintenance	273 (20%)	0.85	0.95	0.85	0.95	276 (19%)	0.69	0.93	0.69	0.93
Momentary time sampling	273 (20%)	0.81	0.95	0.81	0.95	276 (19%)	0.70	0.93	0.7	0.93
Treatment integrity	273 (20%)	0.8	0.95	0.79	0.95	276 (19%)	0.72	0.93	0.72	0.93
Confidence α		0.95		0.95			0.93		0.93	
Useful										
Performance deficit	240 (30%)	0.80	0.97	0.79	0.97	273 (20%)	0.70	0.95	0.70	0.95
Function Matrix	240 (30%)	0.79	0.97	0.78	0.97	273 (20%)	0.75	0.95	0.74	0.95
Functional assessment-based intervention	240 (30%)	0.86	0.97	0.86	0.97	273 (20%)	0.81	0.95	0.80	0.95
Functional assessment interviews	240 (30%)	0.87	0.97	0.87	0.97	273 (20%)	0.74	0.95	0.74	0.95
Social Validity	240 (30%)	0.81	0.97	0.81	0.97	273 (20%)	0.78	0.95	0.78	0.95
Operational Definition of behavior	240 (30%)	0.85	0.97	0.86	0.97	273 (20%)	0.78	0.95	0.78	0.95
Positive Reinforcement	240 (30%)	0.51	0.97	0.52	0.97	273 (20%)	0.60	0.95	0.61	0.96

	Pre					Post				
	n (% Miss.)	Raw Variables		Standardized Variables		n (% Miss.)	Raw Variables		Standardized Variables	
		Correlation with Total	α	Correlation with Total	α		Correlation with Total	α	Correlation with Total	α
Replacement Behavior	240 (30%)	0.68	0.97	0.69	0.97	273 (20%)	0.70	0.95	0.71	0.95
Acquisition Deficit	240 (30%)	0.86	0.97	0.85	0.97	273 (20%)	0.79	0.95	0.79	0.95
ABC data collection	240 (30%)	0.80	0.97	0.80	0.97	273 (20%)	0.75	0.95	0.75	0.95
Antecedent Adjustment	240 (30%)	0.85	0.97	0.85	0.97	273 (20%)	0.73	0.95	0.73	0.95
Extinction	240 (30%)	0.84	0.97	0.84	0.97	273 (20%)	0.77	0.95	0.77	0.95
Generalization and maintenance	240 (30%)	0.89	0.97	0.89	0.97	273 (20%)	0.81	0.95	0.81	0.95
Momentary time sampling	240 (30%)	0.88	0.97	0.88	0.97	273 (20%)	0.77	0.95	0.77	0.95
Treatment integrity	240 (30%)	0.86	0.97	0.85	0.97	273 (20%)	0.76	0.95	0.76	0.95
Useful α		0.97		0.97			0.96		0.96	

Notes: α = Chronbach's alpha; Cor. Tot = correlation total.

Appendix 17.

Criterion-related validity: Concurrent relation of perceived knowledge subscale to actual knowledge subscale across two scoring methods.

	Actual Knowledge			
	Pre-Training Measure		Post-Training Measure	
	Actual (0-1)	Actual (0-3)	Actual (0-1)	Actual (0-3)
Perceived Knowledge (0-3)	Biserial Corr	Pearson Corr	Biserial Corr	Pearson Corr
Item Level				
Performance deficit	0.03	0.01	0.00	0.04
Function Matrix	0.00	0.02	0.12	0.10
Functional assessment-based intervention	0.17	0.12	0.04	0.06
Functional assessment interviews	0.15	0.08	-0.08	-0.02
Social Validity	0.13	0.09	0.03	0.10
Operational Definition of behavior	0.05	0.06	0.13	0.09
Positive Reinforcement	-0.11	-0.01	-0.04	-0.05
Replacement Behavior	0.12	0.12	-0.05	-0.05
Acquisition Deficit	0.10	0.09	0.03	-0.01
ABC data collection	0.11	0.02	0.01	0.02
Antecedent Adjustment	-0.01	0.01	-0.01	0.01
Extinction	0.20	0.16	0.01	0.03
Generalization and maintenance	0.21	0.17	0.06	0.03
Momentary time sampling	0.08	0.09	0.08	0.05
Treatment integrity	0.32	0.25	0.10	0.09
Composite Score (Percent)	0.30	0.34	0.12	0.16

Note: Biserial Corr. = biserial correlations; Pearson Corr. = Pearson correlation. Scoring methods: (a) 0 = incorrect, 1 = correct; (b) 0 = incorrect answer with no accurate information, 1 = partial accurate answer with some inaccurate information, 2 = partial accurate answer with no inaccurate information, 3 = correct answer.

Appendix 18.

Descriptive Statistics, Formative Assessment, Within Session, Day 1-5:Pre and Post

Variable	Pre							Post						
	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.
				Min	Max						Min	Max		
Day 1														
1.01	292	15%	0.88 (0.33)	0.00	1.00	-2.35	3.56	293	14%	0.95 (0.23)	0.00	1.00	-3.94	13.62
1.02	302	12%	0.86 (0.35)	0.00	1.00	-2.10	2.41	292	15%	0.9 (0.3)	0.00	1.00	-2.63	4.95
1.03	304	11%	0.49 (0.5)	0.00	1.00	0.04	-2.01	293	14%	0.79 (0.41)	0.00	1.00	-1.42	0.01
1.04	304	11%	0.47 (0.5)	0.00	1.00	0.11	-2.00	295	14%	0.57 (0.5)	0.00	1.00	-0.27	-1.94
1.05	306	11%	0.33 (0.47)	0.00	1.00	0.71	-1.50	295	14%	0.76 (0.43)	0.00	1.00	-1.24	-0.46
1.06	304	11%	0.27 (0.45)	0.00	1.00	1.02	-0.96	297	13%	0.66 (0.48)	0.00	1.00	-0.66	-1.57
1.07	305	11%	0.9 (0.31)	0.00	1.00	-2.59	4.75	293	14%	0.93 (0.26)	0.00	1.00	-3.34	9.21
1.08	305	11%	0.79 (0.41)	0.00	1.00	-1.46	0.12	295	14%	0.92 (0.27)	0.00	1.00	-3.08	7.53
1.09	304	11%	0.74 (0.44)	0.00	1.00	-1.08	-0.84	297	13%	0.9 (0.31)	0.00	1.00	-2.60	4.80
1.10	306	11%	0.45 (0.5)	0.00	1.00	0.18	-1.98	296	13%	0.52 (0.5)	0.00	1.00	-0.10	-2.00
Comp. Score	277	19%	6.19 (1.45)	2.00	10.00	0.03	-0.04	270	21%	7.88 (1.46)	4.00	10.00	-0.56	0.02
Diff Score	246	28%	1.64 (1.55)	-2.00	6.00	0.15	-0.38							
Day 2														
2.01	284	17%	0.93 (0.26)	0.00	1.00	-3.27	8.78	297	13%	0.95 (0.22)	0.00	1.00	-4.13	15.13
2.02	285	17%	0.69 (0.46)	0.00	1.00	-0.83	-1.32	295	14%	0.82 (0.38)	0.00	1.00	-1.68	0.82

Variable	Pre							Post						
	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.
				Min	Max						Min	Max		
2.03	285	17%	0.55 (0.50)	0.00	1.00	-0.19	-1.98	294	14%	0.4 (0.49)	0.00	1.00	0.40	-1.85
2.04	286	16%	0.86 (0.35)	0.00	1.00	-2.09	2.37	294	14%	0.94 (0.24)	0.00	1.00	-3.68	11.62
2.05	275	20%	0.35 (0.48)	0.00	1.00	0.62	-1.63	290	15%	0.69 (0.46)	0.00	1.00	-0.82	-1.33
2.06	284	17%	0.77 (0.42)	0.00	1.00	-1.27	-0.38	291	15%	0.77 (0.42)	0.00	1.00	-1.29	-0.34
2.07	295	14%	0.82 (0.38)	0.00	1.00	-1.68	0.82	293	14%	0.88 (0.33)	0.00	1.00	-2.31	3.36
2.08	296	13%	0.85 (0.36)	0.00	1.00	-1.95	1.81	292	15%	0.88 (0.33)	0.00	1.00	-2.35	3.56
2.09	293	14%	0.18 (0.39)	0.00	1.00	1.67	0.78	293	14%	0.49 (0.50)	0.00	1.00	0.05	-2.01
2.10	282	18%	0.37 (0.48)	0.00	1.00	0.53	-1.73	293	14%	0.88 (0.33)	0.00	1.00	-2.31	3.36
Comp. Score	223	35%	6.45 (1.33)	3.00	10.00	-0.24	0.27	273	20%	7.76 (1.34)	3.00	10.00	-0.68	0.71
Diff Score	203	41%	1.19 (1.64)	-5.00	6.00	-0.43	1.21							
Day 3														
3.01	245	28%	0.67 (0.47)	0.00	1.00	-0.72	-1.49	166	51%	0.85 (0.36)	0.00	1.00	-1.97	1.91
3.02	252	26%	0.35 (0.48)	0.00	1.00	0.64	-1.61	275	20%	0.54 (0.5)	0.00	1.00	-0.17	-1.99
3.03	255	25%	0.73 (0.45)	0.00	1.00	-1.02	-0.97	276	19%	0.76 (0.43)	0.00	1.00	-1.21	-0.55
3.04	231	32%	0.55 (0.50)	0.00	1.00	-0.22	-1.97	271	21%	0.59 (0.49)	0.00	1.00	-0.39	-1.87

Variable	Pre							Post						
	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.
				Min	Max						Min	Max		
3.05	249	27%	0.63 (0.48)	0.00	1.00	-0.54	-1.72	279	18%	0.81 (0.39)	0.00	1.00	-1.62	0.63
3.06	253	26%	0.89 (0.31)	0.00	1.00	-2.50	4.27	282	18%	0.95 (0.22)	0.00	1.00	-4.00	14.13
3.07	267	22%	0.82 (0.38)	0.00	1.00	-1.68	0.82	282	18%	0.93 (0.25)	0.00	1.00	-3.47	10.11
3.08	263	23%	0.56 (0.50)	0.00	1.00	-0.22	-1.97	281	18%	0.89 (0.31)	0.00	1.00	-2.56	4.59
3.09	268	22%	0.78 (0.42)	0.00	1.00	-1.36	-0.16	268	22%	0.73 (0.45)	0.00	1.00	-1.03	-0.95
3.10	253	26%	0.13 (0.34)	0.00	1.00	2.21	2.90	278	19%	0.09 (0.29)	0.00	1.00	2.81	5.92
Comp. Score	155	55%	6.31 (1.52)	2.00	10.00	-0.17	-0.20	142	58%	7.36 (1.45)	3.00	10.00	-0.59	0.00
Diff Score	82	76%	1.17 (1.68)	-2.00	7.00	0.82	1.34							
Day 4														
4.01	241	30%	0.57 (0.50)	0.00	1.00	-0.30	-1.93	243	29%	0.74 (0.44)	0.00	1.00	-1.08	-0.84
4.02	239	30%	0.41 (0.49)	0.00	1.00	0.37	-1.88	250	27%	0.66 (0.47)	0.00	1.00	-0.68	-1.55
4.03	252	26%	0.19 (0.39)	0.00	1.00	1.59	0.52	244	29%	0.42 (0.49)	0.00	1.00	0.32	-1.92
4.04	254	26%	0.95 (0.21)	0.00	1.00	-4.29	16.56	249	27%	0.94 (0.23)	0.00	1.00	-3.88	13.13
4.05	243	29%	0.64 (0.48)	0.00	1.00	-0.60	-1.66	244	29%	0.62 (0.49)	0.00	1.00	-0.51	-1.75
4.06	248	27%	0.33 (0.47)	0.00	1.00	0.74	-1.46	248	27%	0.49 (0.50)	0.00	1.00	0.03	-2.02

Variable	Pre							Post						
	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.
				Min	Max						Min	Max		
4.07	248	27%	0.37 (0.48)	0.00	1.00	0.56	-1.71	248	27%	0.91 (0.28)	0.00	1.00	-2.91	6.52
4.08	247	28%	0.51 (0.50)	0.00	1.00	-0.04	-2.01	246	28%	0.86 (0.35)	0.00	1.00	-2.06	2.26
4.09	251	27%	0.09 (0.28)	0.00	1.00	2.93	6.66	248	27%	0.30 (0.46)	0.00	1.00	0.87	-1.26
4.10	252	26%	0.93 (0.26)	0.00	1.00	-3.35	9.28	248	27%	0.98 (0.14)	0.00	1.00	-6.87	45.56
Comp. Score	170	50%	5 (1.72)	2.00	10.00	0.41	-0.28	201	41%	7.03 (1.70)	2.00	10.00	-0.67	0.15
Diff Score	127	63%	1.87 (1.7)	-2.00	6.00	0.15	-0.32							
Day 5														
5.01	193	44%	0.56 (0.50)	0.00	1.00	-0.26	-1.95	250	27%	0.74 (0.44)	0.00	1.00	-1.10	-0.79
5.02	226	34%	0.53 (0.50)	0.00	1.00	-0.12	-2.00	266	22%	0.78 (0.42)	0.00	1.00	-1.35	-0.19
5.03	225	34%	0.37 (0.48)	0.00	1.00	0.55	-1.72	262	23%	0.78 (0.42)	0.00	1.00	-1.35	-0.18
5.04	245	28%	0.87 (0.33)	0.00	1.00	-2.26	3.14	265	23%	0.90 (0.3)	0.00	1.00	-2.65	5.05
5.05	246	28%	0.78 (0.41)	0.00	1.00	-1.36	-0.14	261	24%	0.81 (0.39)	0.00	1.00	-1.61	0.59
5.06	246	28%	0.84 (0.37)	0.00	1.00	-1.88	1.55	263	23%	0.93 (0.26)	0.00	1.00	-3.32	9.12
5.07	248	27%	0.70 (0.46)	0.00	1.00	-0.89	-1.22	267	22%	0.87 (0.33)	0.00	1.00	-2.25	3.08
5.08	249	27%	0.31 (0.46)	0.00	1.00	0.85	-1.29	262	23%	0.40 (0.49)	0.00	1.00	0.39	-1.86

Variable	Pre							Post						
	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.	N	% Mis	*M*(*SD*)	Range		Skew.	Kurt.
				Min	Max						Min	Max		
5.09	256	25%	0.51 (0.50)	0.00	1.00	-0.03	-2.01	264	23%	0.85 (0.36)	0.00	1.00	-2.00	2.00
5.10	253	26%	0.95 (0.22)	0.00	1.00	-4.09	14.83	265	23%	0.95 (0.22)	0.00	1.00	-4.02	14.27
Comp. Score	141	59%	6.60 (1.72)	2.00	10.00	-0.14	-0.27	218	36%	8.08 (1.52)	2.00	10.00	-0.95	0.86
Diff Score	112	67%	1.73 (1.49)	-2.00	6.00	0.36	0.65							

Note. Comp = composite score, Diff = diffence score, Kurt. = kurtosis, and Skew = skewness.

Appendix 19.

Descriptive Statistics, Knowledge, Confidence, and Use Constructs, Pre and Post

Variable	Pre							Post						
	N	% Miss	M(SD)	Range		Skew.	Kurt.	N	% Miss	M(SD)	Range		Skew.	Kurt.
				Min	Max						Min	Max		
Perceived Knowledge														
Performance deficit	328	4%	0.95 (0.91)	0.00	3.00	0.59	-0.57	292	15%	2.01 (0.63)	1.00	3.00	-0.01	-0.45
Function Matrix	328	4%	0.46 (0.71)	0.00	3.00	1.27	0.33	291	15%	2.11 (0.63)	1.00	3.00	-0.08	-0.47
Functional assessment-based intervention	330	4%	1.19 (0.99)	0.00	3.00	0.28	-1.02	290	15%	2.18 (0.57)	1.00	3.00	0.01	-0.16
Functional assessment interviews	330	4%	0.85 (0.94)	0.00	3.00	0.77	-0.47	293	14%	2.22 (0.65)	1.00	3.00	-0.25	-0.70
Social Validity	329	4%	0.59 (0.79)	0.00	3.00	1.09	0.18	293	14%	2.14 (0.64)	0.00	3.00	-0.21	-0.27
Operational Definition of behavior	331	3%	1.13 (1.03)	0.00	3.00	0.43	-1.02	292	15%	2.21 (0.67)	1.00	3.00	-0.27	-0.79
Positive Reinforcement	330	4%	2.26 (0.80)	0.00	3.00	-0.80	-0.11	293	14%	2.59 (0.55)	1.00	3.00	-0.86	-0.34
Replacement Behavior	330	4%	1.86 (0.90)	0.00	3.00	-0.31	-0.76	293	14%	2.45 (0.58)	1.00	3.00	-0.47	-0.72
Acquisition Deficit	326	5%	0.61 (0.83)	0.00	3.00	1.18	0.51	291	15%	1.92 (0.64)	0.00	3.00	-0.09	-0.12
ABC data collection	329	4%	1.24 (1.13)	0.00	3.00	0.31	-1.32	293	14%	2.37 (0.62)	1.00	3.00	-0.45	-0.65
Antecedent Adjustment	328	4%	0.97 (0.96)	0.00	3.00	0.61	-0.69	292	15%	2.14 (0.62)	1.00	3.00	-0.10	-0.45
Extinction	333	3%	0.95 (1)	0.00	3.00	0.64	-0.78	291	15%	2.13 (0.64)	1.00	3.00	-0.12	-0.62

Generalization and maintenance	332	3%	0.89 (0.98)	0.00	3.00	0.75	-0.62	292	15%	2.03 (0.61)	0.00	3.00	-0.10	-0.02
Momentary time sampling	333	3%	0.94 (1.01)	0.00	3.00	0.72	-0.67	292	15%	2.27 (0.67)	1.00	3.00	-0.36	-0.78
Treatment integrity	331	3%	0.8 (0.99)	0.00	3.00	0.93	-0.37	293	14%	2.24 (0.64)	1.00	3.00	-0.25	-0.65
Comp. Score	297	13%	15.27 (10.76)	0.00	42.00	0.64	-0.56	281	18%	32.94 (6.80)	15.00	45.00	-0.32	-0.07
Diff Score	246	28%	17.2 (10.07)	-5.00	43.00	-0.08	-0.70							
Perceived Confidence														
Performance deficit	317	7%	0.79 (0.88)	0.00	3.00	0.91	-0.02	290	15%	1.83 (0.66)	0.00	3.00	-0.03	-0.29
Function Matrix	308	10%	0.44 (0.71)	0.00	3.00	1.48	1.26	291	15%	1.94 (0.67)	0.00	3.00	-0.13	-0.25
Functional assessment-based intervention	319	7%	1.05 (0.93)	0.00	3.00	0.42	-0.82	291	15%	1.99 (0.63)	0.00	3.00	-0.16	0.04
Functional assessment interviews	316	8%	0.81 (0.93)	0.00	3.00	0.84	-0.35	292	15%	2.18 (0.71)	0.00	3.00	-0.46	-0.34
Social Validity	315	8%	0.56 (0.79)	0.00	3.00	1.18	0.43	292	15%	2.05 (0.65)	0.00	3.00	-0.12	-0.32
Operational Definition of behavior	315	8%	1.08 (1)	0.00	3.00	0.46	-0.93	292	15%	2.07 (0.7)	0.00	3.00	-0.21	-0.54
Positive Reinforcement	327	4%	2.12 (0.86)	0.00	3.00	-0.56	-0.67	293	14%	2.52 (0.61)	1.00	3.00	-0.87	-0.24
Replacement Behavior	327	4%	1.71 (0.92)	0.00	3.00	-0.10	-0.89	293	14%	2.34 (0.63)	0.00	3.00	-0.51	-0.22
Acquisition Deficit	313	8%	0.58 (0.81)	0.00	3.00	1.21	0.49	291	15%	1.81 (0.67)	0.00	3.00	-0.17	-0.02
ABC data collection	313	8%	1.20 (1.09)	0.00	3.00	0.39	-1.16	292	15%	2.23 (0.68)	1.00	3.00	-0.33	-0.84

Antecedent Adjustment	316	8%	0.90 (0.91)	0.00	3.00	0.62	-0.65	291	15%	2.02 (0.67)	0.00	3.00	-0.23	-0.12
Extinction	318	7%	0.87 (0.92)	0.00	3.00	0.66	-0.67	291	15%	1.98 (0.67)	0.00	3.00	-0.11	-0.40
Generalization and maintenance	321	6%	0.83 (0.92)	0.00	3.00	0.71	-0.64	293	14%	1.91 (0.65)	0.00	3.00	-0.14	-0.06
Momentary time sampling	322	6%	0.93 (1.01)	0.00	3.00	0.72	-0.67	291	15%	2.19 (0.71)	0.00	3.00	-0.35	-0.79
Treatment integrity	319	7%	0.79 (0.96)	0.00	3.00	0.89	-0.40	293	14%	2.16 (0.68)	0.00	3.00	-0.34	-0.36
Comp. Score	273	20%	14.06 (10.55)	0.00	45.00	0.69	-0.40	276	19%	31.30 (7.19)	5.00	45.00	-0.48	0.23
Diff Score	225	34%	16.24 (10.31)	-13.00	43.00	-0.04	-0.46							
Perceived Use														
Performance deficit	286	16%	1.57 (1.11)	0.00	3.00	-0.14	-1.32	291	15%	2.17 (0.76)	0.00	3.00	-0.39	-0.85
Function Matrix	274	20%	1.24 (1.12)	0.00	3.00	0.28	-1.32	292	15%	2.29 (0.77)	0.00	3.00	-0.69	-0.57
Functional assessment-based intervention	290	15%	1.83 (1.05)	0.00	3.00	-0.43	-1.02	292	15%	2.37 (0.70)	0.00	3.00	-0.83	0.13
Functional assessment interviews	287	16%	1.64 (1.12)	0.00	3.00	-0.20	-1.32	291	15%	2.32 (0.72)	0.00	3.00	-0.67	-0.40
Social Validity	281	18%	1.31 (1.07)	0.00	3.00	0.20	-1.21	291	15%	2.30 (0.71)	0.00	3.00	-0.56	-0.62
Operational Definition of behavior	290	15%	1.80 (1.07)	0.00	3.00	-0.39	-1.12	291	15%	2.38 (0.70)	1.00	3.00	-0.70	-0.72
Positive Reinforcement	321	6%	2.55 (0.71)	0.00	3.00	-1.51	1.63	293	14%	2.70 (0.52)	1.00	3.00	-1.49	1.30
Replacement Behavior	310	9%	2.29 (0.84)	0.00	3.00	-0.95	0.02	292	15%	2.65 (0.54)	0.00	3.00	-1.37	1.72

Acquisition Deficit	279	18%	1.33 (1.11)	0.00	3.00	0.20	-1.31	290	15%	2.17 (0.72)	0.00	3.00	-0.38	-0.64
ABC data collection	287	16%	1.89 (1.06)	0.00	3.00	-0.50	-1.02	293	14%	2.47 (0.68)	0.00	3.00	-1.05	0.40
Antecedent Adjustment	286	16%	1.71 (1.08)	0.00	3.00	-0.28	-1.21	291	15%	2.33 (0.68)	0.00	3.00	-0.58	-0.43
Extinction	286	16%	1.56 (1.07)	0.00	3.00	-0.05	-1.25	291	15%	2.29 (0.70)	0.00	3.00	-0.52	-0.63
Generalization and maintenance	287	16%	1.56 (1.10)	0.00	3.00	-0.09	-1.30	290	15%	2.29 (0.69)	1.00	3.00	-0.44	-0.83
Momentary time sampling	285	17%	1.53 (1.09)	0.00	3.00	-0.09	-1.28	288	16%	2.29 (0.72)	0.00	3.00	-0.55	-0.68
Treatment integrity	286	16%	1.53 (1.17)	0.00	3.00	-0.03	-1.48	292	15%	2.42 (0.67)	0.00	3.00	-0.81	-0.18
Comp. Score	240	30%	25.06 (13.44)	0.00	45.00	-0.03	-1.15	273	20%	35.58 (8.12)	10.00	45.00	-0.63	-0.40
Diff Score	192	44%	9.66 (13.74)	-25.00	45.00	0.28	-0.07							

Note. Actual Knowledge (Correct, Incorrect) = multiple choice, correct incorrect; Actual knowledge (scored) = Multiple choice, weghted 0-3; Comp = composite score; Diff = diffence score; Kurt. = kurtosis; and Skew = skewness.

Appendix 20.

Step 1: Identifying students who need a FABI: Completion and Quality across Teams

Task Assigned in Step 1	% Missing	Item Completion (*n*) %				Item Quality (*n*) %			
Assignment	(*n*) %	0	1	2	3	0	1	2	3
Communicate with parents and secure permission to conduct the Functional Assessment based intervention (use your district procedures and forms for subsequent students).	1 (1.49)	1 (1.52)	0 (0)	0 (0)	65 (98.48)	1 (1.52)	0 (0)	0 (0)	65 (98.48)
Talk to the student to answer questions (assent according to your district procedures)	1 (1.49)	1 (1.52)	0 (0)	0 (0)	65 (98.48)	1 (1.52)	0 (0)	0 (0)	65 (98.48)
Complete, confirm, and turn in Referral Checklist: Functional Assessment-Based Interventions (HO1)	2 (2.99)	3 (4.62)	1 (1.54)	5 (7.69)	56 (86.15)	0 (0)	0 (0)	8 (12.90)	54 (87.10)

Note. Percentages represent items completed and submitted by teams. Step completion: Each item was scored on a 4-point Likert type scale: 0 = Item not completed, 1 = Item partially completed, less than half, 2 = Item partially completed, at least half or greater, 3 = Item completed. Step quality: Each item was scored on a 4-point Likert type scale: 0 = No knowledge/accuracy, 1 = Partially accurate knowledge, but inaccurate information included, 2 = Partially accurate knowledge, with no inaccurate information included, 3 = All provided information correct.

Appendix 21.

Step 2: Conducting the functional assessment: Completion and Quality across Teams

Task Assigned in Step 2	% Missing	Item Completion (*n*) %				Item Quality (*n*) %			
Assignment	(*n*) %	0	1	2	3	0	1	2	3
Complete, confirm, and turn in Data collected from Informal Observation: Classroom Map; copy of PBIS plan; instructional schedule; classwide system for behavior management	2 (2.99)	3 (4.62)	0 (0)	0 (0)	62 (95.38)	0 (0)	0 (0)	0 (0)	62 (100)
Complete, confirm, and turn in Universal Checklist HO A	2 (2.99)	0 (0)	0 (0)	11 (16.92)	54 (83.08)	0 (0)	1 (1.54)	3 (4.62)	61 (93.85)
Step 2.1 Records Review Complete HO 2 and 3 SARS Forms	2 (2.99)	1 (1.54)	2 (3.08)	56 (86.15)	6 (9.23)	0 (0)	40 (62.50)	19 (29.69)	5 (7.81)
Step 2.2 Interviews Complete, confirm, and turn in HO 4 Teacher Interview, including operational definition of target behavior	2 (2.99)	2 (3.08)	0 (0)	11 (16.92)	52 (80.00)	0 (0)	13 (20.63)	11 (17.46)	39 (61.90)
Complete and confirm HO 6 FABI Planning for Target Behavior with operational definition [Confirmed with Coach]	2 (2.99)	2 (3.08)	1 (1.54)	1 (1.54)	61 (93.85)	0 (0)	10 (15.87)	13 (20.63)	40 (63.49)
Complete, confirm, and turn in HO 4 Parent Interview	2 (2.99)	10 (15.38)	4 (6.15)	11 (16.92)	40 (61.54)	1 (1.82)	29 (52.73)	3 (5.45)	22 (40.00)
Complete, confirm, and turn in HO 7 Student Interview	2 (2.99)	4 (6.15)	5 (7.69)	21 (32.31)	35 (53.85)	0 (0)	18 (29.51)	15 (24.59)	28 (45.90)
Step 2.3 Rating Scales Review, confirm, and turn in Social Skills Improvement System – Rating Scale (Teacher Version); Scored by Coach; Report	3 (4.48)	1 (1.56)	0 (0)	1 (1.56)	62 (96.88)	0 (0)	0 (0)	0 (0)	63 (100)
Review, confirm, and turn in Social Skills Improvement System – Rating Scale (Parent Version)); Scored by Coach;	2 (2.99)	4 (6.15)	0 (0)	0 (0)	61 (93.85)	0 (0)	0 (0)	0 (0)	61 (100)

Task Assigned in Step 2 Assignment	% Missing (*n*) %	Item Completion (*n*) % 0	 1	 2	 3	Item Quality (*n*) % 0	 1	 2	 3
Step 2.4 Direct Observation (A-B-C Data Collection) Review, confirm, and turn in HO 8 A-B-C data (data collection form); write in the number of hours (N = 3) you collected A-B-C and the number of instances (N = 8 minimum) you saw the target behavior occur (Check that data and time are recorded).	2 (2.99)	2 (3.08)	3 (4.62)	41 (63.08)	19 (29.23)	1 (1.64)	43 (70.49)	15 (24.59)	2 (3.28)
Step 2.5 Identify the Function Write and confirm HO 6, p. 3 Function Matrix, include a hypothesis statement as to what is maintaining the behavior	2 (2.99)	1 (1.54)	6 (9.23)	14 (21.54)	44 (67.69)	0 (0)	0 (0)	0 (0)	64 (100)
Complete, confirm, and turn in HO 6 FABI Planning for Replacement Behavior with operational definitions [Confirmed with Coach]	2 (2.99)	2 (3.08)	4 (6.15)	9 (13.85)	50 (76.92)	0 (0)	62 (98.41)	0 (0)	1 (1.59)
Complete and turn this checklist into your coach. (To clarify: Complete HO 6 pp. 1-3 up to function matrix and hypothesis. You will be given feedback on your progress prior to completing subsequent pages.)	2 (2.99)	0 (0)	0 (0)	0 (0)	65 (100)	0 (0)	0 (0)	0 (0)	65 (100)

Note. Percentages represent items completed and submitted by teams. Step completion: Each item was scored on a 4-point Likert type scale: 0 = Item not completed, 1 = Item partially completed, less than half, 2 = Item partially completed, at least half or greater, 3 = Item completed. Step quality: Each item was scored on a 4-point Likert type scale: 0 = No knowledge/accuracy, 1 = Partially accurate knowledge, but inaccurate information included, 2 = Partially accurate knowledge, with no inaccurate information included, 3 = All provided information correct.

Appendix 22.

Step 3: Collecting Baseline Data: Completion and Quality across Teams

Task Assigned in Step 3	% Missing	Item Completion (*n*) %				Item Quality (*n*) %			
Assignment	(*n*) %	0	1	2	3	0	1	2	3
Complete and confirm pages 1 through 4 on HO 6 Planning Sheet	2 (2.99)	4 (6.15)	1 (1.54)	18 (27.69)	42 (64.62)	0 (0)	61 (100)	0 (0)	0 (0)
What is the behavioral dimension you are focusing on? (see pages 1 and 2, under target and placement behaviors in HO 6)	2 (2.99)	39 (60.00)	0 (0)	0 (0)	26 (40.00)	19 (73.08)	1 (3.85)	0 (0)	6 (23.08)
What measurement system did you select to measure behavior? (see pages 1 and 2, under target and placement behaviors in HO 6)	2 (2.99)	7 (10.77)	0 (0)	0 (0)	58 (89.23)	12 (20.69)	6 (10.34)	4 (6.90)	36 (62.07)
Describe the data collection procedures you will use to measure the behavior: materials needed, data collection sheet, scheduled observation times.	2 (2.99)	38 (58.46)	0 (0)	2 (3.08)	25 (38.46)	1 (3.85)	1 (3.85)	6 (23.08)	18 (69.23)
How did your team become reliable in data collection?	2 (2.99)	34 (52.31)	1 (1.54)	1 (1.54)	29 (44.62)	2 (6.45)	4 (12.90)	7 (22.58)	18 (58.06)
How many reliability data observations were completed?	3 (4.48)	32 (50.00)	0 (0)	0 (0)	32 (50.00)	1 (3.33)	1 (3.33)	4 (13.33)	24 (80.00)
What was the percent of agreement between observers (inter-observer agreement; IOA) on the data collection training (reliability training)?	2 (2.99)	34 (52.31)	0 (0)	1 (1.54)	30 (46.15)	1 (3.70)	2 (7.41)	2 (7.41)	22 (88.48)
How many baseline data points did you collect?	2 (2.99)	7 (10.77)	2 (3.08)	9 (13.85)	47 (72.31)	1 (2.13)	19 (40.43)	6 (12.77)	21 (44.68)
How many baseline data points included IOA? (at least 25% of observations)	2 (2.99)	14 (21.54)	4 (6.15)	4 (6.15)	43 (66.15)	1 (2.94)	7 (20.59)	3 (8.82)	23 (67.65)
What was your IOA for baseline?	2 (2.99)	14 (21.54)	4 (6.15)	4 (6.15)	43 (66.15)	1 (2.86)	8 (22.86)	3 (8.57)	23 (65.71)
Graph your baseline data	2	8	0	1	56	0	18	27	12

Task Assigned in Step 3	% Missing	Item Completion (*n*) %				Item Quality (*n*) %			
Assignment	(*n*) %	0	1	2	3	0	1	2	3
	(2.99)	(12.31)	(0)	(1.54)	(86.15)	(0)	(31.58)	(47.37)	(21.05)
Complete and turn this checklist into your coach.	2 (2.99)	2 (3.08)	0 (0)	0 (0)	63 (96.92)	0 (0)	0 (0)	0 (0)	63 (100)

Note. Percentages represent items completed and submitted by teams. Step completion: Each item was scored on a 4-point Likert type scale: 0 = Item not completed, 1 = Item partially completed, less than half, 2 = Item partially completed, at least half or greater, 3 = Item completed. Step quality: Each item was scored on a 4-point Likert type scale: 0 = No knowledge/accuracy, 1 = Partially accurate knowledge, but inaccurate information included, 2 = Partially accurate knowledge, with no inaccurate information included, 3 = All provided information correct.

Appendix 23.

Step 4: Designing the Intervention: Completion and Quality across Teams

Task Assigned in Step 4	% Missing	Item Completion (*n*) %				Item Quality (*n*) %			
Assignment	(*n*) %	0	1	2	3	0	1	2	3
Step 4.1 Select an Intervention Method Select Intervention Method and confirm with teacher –HO 6 pages 4-9	4 (5.97)	11 (17.46)	0 (0)	0 (0)	52 (82.54)	0 (0)	9 (17.65)	0 (0)	42 (82.35)
Step 4.2 Develop Intervention Components Draft A-R-E components (Antecedent adjustments, Reinforcement adjustments, and Extinction components) Link each intervention tactic to the hypothesized function on the planning sheet (page 6, 7, 8, or 9 depending on the method you select according to the functional assessment intervention decision model.	2 (2.99)	20 (30.77)	2 (3.08)	0 (0)	43 (66.15)	0 (0)	19 (41.30)	7 (15.22)	20 (43.48)
Step 4.3 Components Related to Valid Inference Making Draft Treatment Integrity Form including quality rubric HO 11	2 (2.99)	3 (4.62)	1 (1.54)	9 (13.85)	52 (80.00)	0 (0)	21 (34.43)	13 (21.31)	27 (44.26)
Select and review social validity forms HO 12.1 and 13.1	2 (2.99)	6 (9.23)	3 (4.62)	18 (27.69)	38 (58.46)	0 (0)	21 (35.59)	3 (5.08)	35 (59.32)
Prepare a plan for introducing the intervention to the teacher – include a check for understanding.	2 (2.99)	16 (24.62)	0 (0)	0 (0)	49 (75.38)	2 (4.08)	1 (2.04)	29 (59.18)	17 (34.69)
Prepare a plan for introducing the intervention to the students – include a check for understanding.	2 (2.99)	16 (24.62)	0 (0)	2 (3.08)	47 (72.31)	1 (2.04)	2 (4.08)	14 (28.57)	32 (65.31)
Revise and finalize A-R-E Intervention Components using feedback from the teacher and draft final TI form HO 11	2 (2.99)	5 (7.69)	0 (0)	6 (9.23)	54 (83.08)	0 (0)	29 (48.33)	9 (15.00)	22 (36.67)

Task Assigned in Step 4	% Missing	Item Completion (*n*) %				Item Quality (*n*) %			
Assignment	(*n*) %	0	1	2	3	0	1	2	3
Prepare intervention materials	NA	NA	NA	NA	NA	NA	NA	NA	NA
Collect additional baseline data after any school breaks (3 pts.) with at least 1 IOA.	17 (25.37)	40 (80.00)	1 (2.00)	1 (2.00)	8 (16.00)	0 (0)	0 (0)	1 (12.50)	7 (87.50)
Complete and turn this checklist into your coach.	2 (2.99)	3 (4.62)	0 (0)	0 (0)	62 (95.38)	0 (0)	0 (0)	0 (0)	62 (100)

Note. Percentages represent items completed and submitted by teams. Step completion: Each item was scored on a 4-point Likert type scale: 0 = Item not completed, 1 = Item partially completed, less than half, 2 = Item partially completed, at least half or greater, 3 = Item completed. Step quality: Each item was scored on a 4-point Likert type scale: 0 = No knowledge/accuracy, 1 = Partially accurate knowledge, but inaccurate information included, 2 = Partially accurate knowledge, with no inaccurate information included, 3 = All provided information correct. NA = Not applicable (not rated for quality).

Appendix 24

Step 5: Testing the Intervention: Completion and Quality across Teams

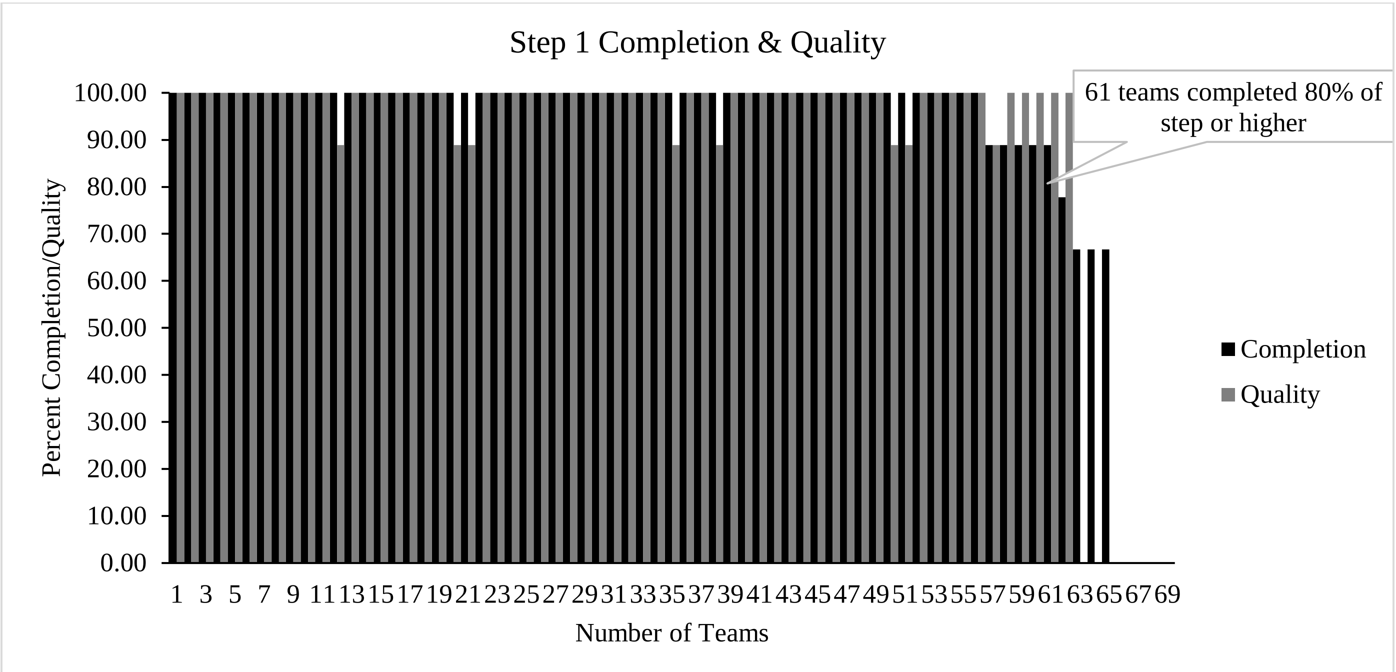
Task Assigned in Step 5	% Missing	Item Completion (*n*) %				Item Quality (*n*) %			
Assignment	(*n*) %	0	1	2	3	0	1	2	3
Implement Intervention	3 (4.48)	11 (17.19)	3 (4.69)	1 (1.56)	49 (76.56)	0 (0)	1 (2.00)	0 (0)	49 (98.00)
Collect Treatment Integrity data daily (teacher perspective) with IOA for 25% of sessions (outside team observer).	3 (4.48)	14 (21.88)	4 (6.25)	17 (26.56)	29 (45.31)	2 (7.41)	5 (18.52)	3 (11.11)	17 (62.96)
Collect Min of 5 data points (behavior measurement – same behavior and measurement system as baseline) – with 25% IOA [Report as number of sessions, % of sessions, and actual IOA %]	3 (4.48)	13 (20.31)	1 (1.56)	9 (14.06)	41 (64.06)	0 (0)	5 (21.74)	3 (13.04)	15 (65.22)
How many intervention data points did your collect?	3 (4.48)	13 (20.31)	1 (1.56)	9 (14.06)	41 (64.06)	0 (0)	5 (22.73)	3 (13.64)	14 (63.64)
How many intervention data points included IOA?	3 (4.48)	30 (46.88)	5 (7.81)	2 (3.13)	27 (42.19)	0 (0)	0 (0)	0 (0)	13 (100)
What was your IOA for intervention?	3 (4.48)	31 (48.44)	4 (6.25)	2 (3.13)	27 (42.19)	0 (0)	0 (0)	0 (0)	11 (100)
Graph your intervention data. (Post for coaches review and for support for deciding when to withdrawal the intervention)	3 (4.48)	11 (17.19)	0 (0)	3 (4.69)	50 (78.13)	0 (0)	16 (30.77)	23 (44.23)	13 (25.00)
Withdrawal of the intervention with at least 3 data points (1 IOA)*Note phase change decisions for each phase are guided by student performance on variables measured	3 (4.48)	18 (28.13)	5 (7.81)	18 (28.13)	23 (35.94)	1 (4.76)	2 (9.52)	5 (23.81)	13 (61.90)
Complete Treatment Integrity Form (daily by interventionist [teacher] 25% IOA)	3 (4.48)	33 (51.56)	4 (6.25)	10 (15.63)	17 (26.56)	2 (13.33)	1 (6.67)	4 (26.67)	8 (53.33)
Graph withdrawal data (Post for coaches review)	3 (4.48)	17 (26.56)	0 (0)	1 (1.56)	46 (71.88)	0 (0)	13 (28.26)	18 (39.13)	15 (32.61)

Task Assigned in Step 5 Assignment	% Missing (*n*) %	Item Completion (*n*) % 0	1	2	3	Item Quality (*n*) % 0	1	2	3
Reintroduce the intervention.	4 (5.97)	22 (34.92)	0 (0)	1 (1.59)	40 (63.49)	0 (0)	0 (0)	0 (0)	39 (100)
Collect Treatment Integrity data daily (teacher perspective) with IOA for 25% of sessions (outside team observer).	3 (4.48)	35 (54.69)	2 (3.13)	7 (10.94)	20 (31.25)	0 (0)	2 (11.76)	3 (17.65)	12 (70.59)
Collect Min of 3 data points (behavior measurement – same behavior and measurement system throughout all phases) – with 25% IOA [Report as number of sessions, % of sessions, and actual IOA %]	3 (4.48)	23 (35.94)	4 (6.25)	16 (25.00)	21 (32.81)	0 (0)	2 (11.76)	2 (11.76)	13 (76.47)
Plan for follow up data collection to assess maintenance. HO 6 and 6.1	3 (4.48)	22 (34.38)	1 (1.56)	2 (3.13)	39 (60.94)	5 (11.90)	11 (26.19)	21 (50.00)	5 (11.90)
Work with your coaches to complete behavior intervention plan and graphed data to share with teacher and parents	3 (4.48)	10 (15.63)	6 (9.38)	28 (43.75)	20 (31.25)	0 (0)	53 (98.15)	0 (0)	1 (1.85)
Conduct final check of ethical considerations HO 14	3 (4.48)	19 (29.69)	1 (1.56)	10 (15.63)	34 (53.13)	0 (0)	21 (46.67)	13 (28.89)	11 (24.44)
After reviewing final graph, assess POST social validity. HO 12.2 Teacher and HO 13.2 Student	3 (4.48)	20 (31.25)	1 (1.56)	12 (18.75)	31 (48.44)	0 (0)	13 (30.23)	2 (4.65)	28 (65.12)
Complete and turn this checklist into your coach.	3 (4.48)	5 (7.81)	0 (0)	0 (0)	59 (92.19)	0 (0)	0 (0)	1 (1.69)	58 (98.31)

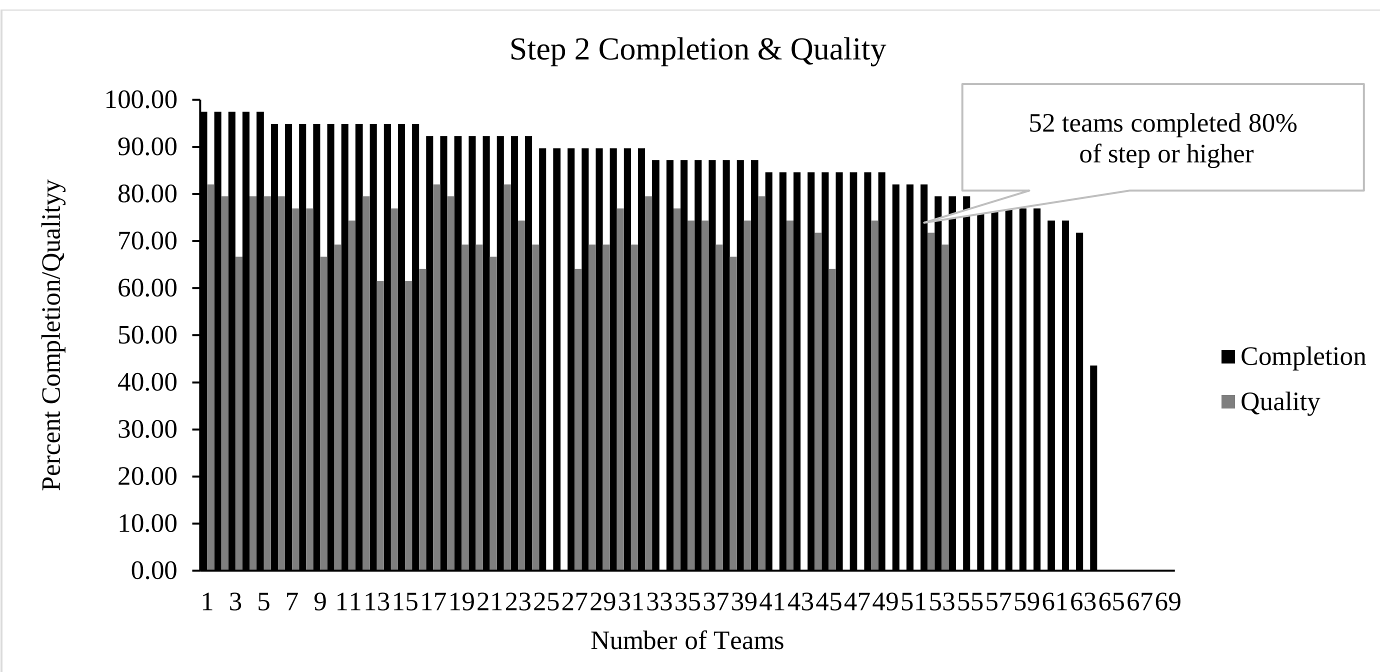
Note. Percentages represent items completed and submitted by teams. Step completion: Each item was scored on a 4-point Likert type scale: 0 = Item not completed, 1 = Item partially completed, less than half, 2 = Item partially completed, at least half or greater, 3 = Item completed. Step quality: Each item was scored on a 4-point Likert type scale: 0 = No knowledge/accuracy, 1 = Partially accurate knowledge, but inaccurate information included, 2 = Partially accurate knowledge, with no inaccurate information included, 3 = All provided information correct.

Appendix 25.
FABI Step Completion and Step Quality. (Panels A-E)

Panel A

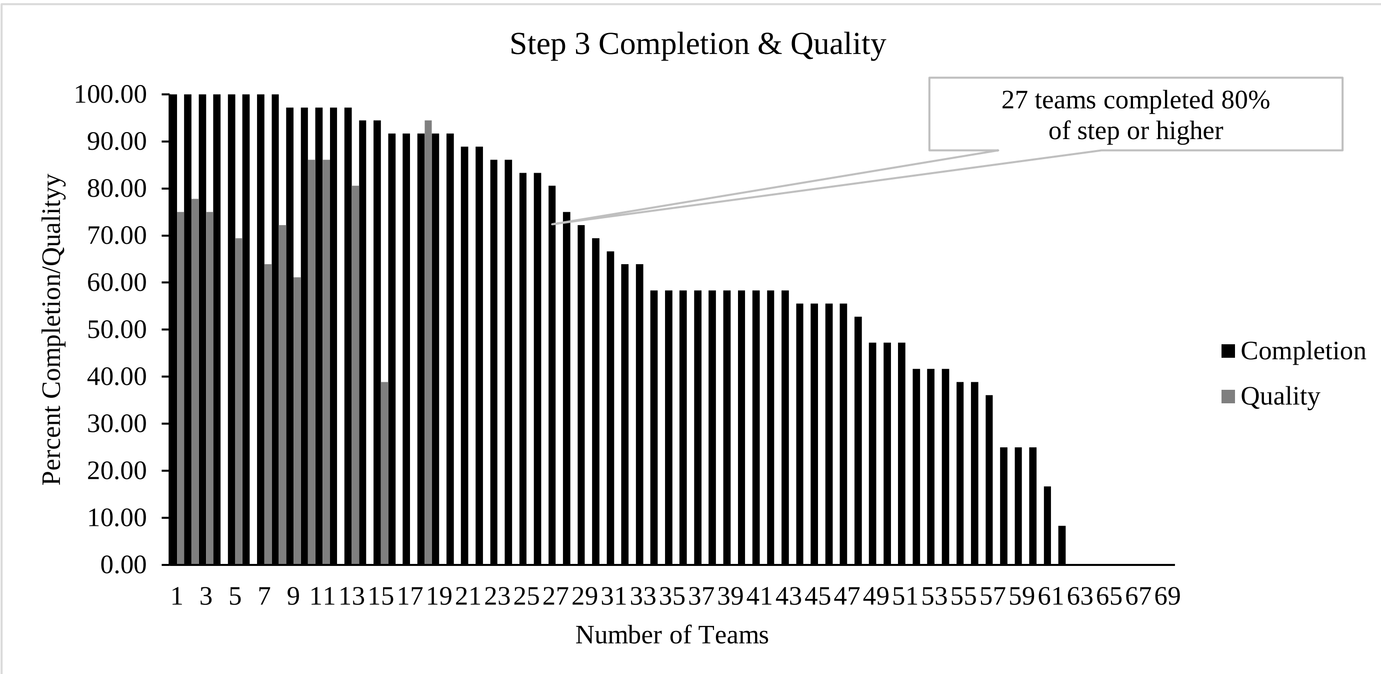


Panel B

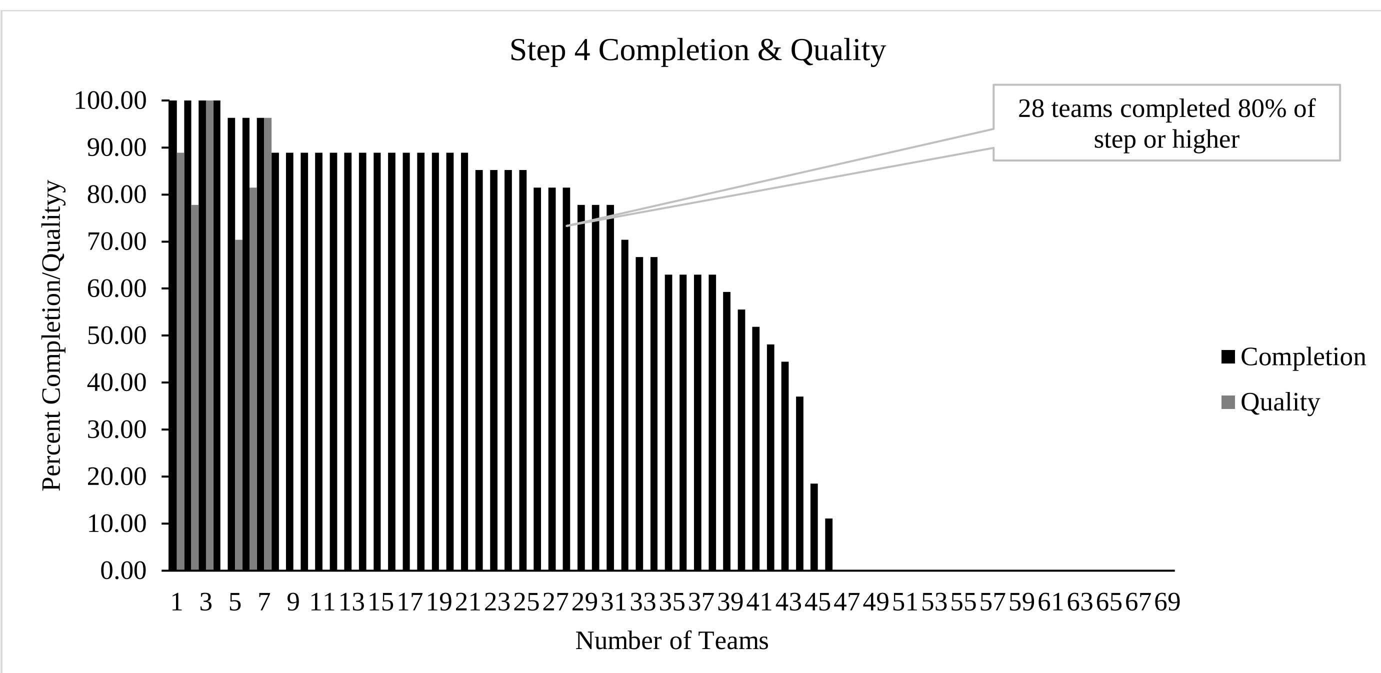


Appendix 25**.** *FABI Step Completion and Step Quality.(Panels A-E) – Cont't*

Panel C

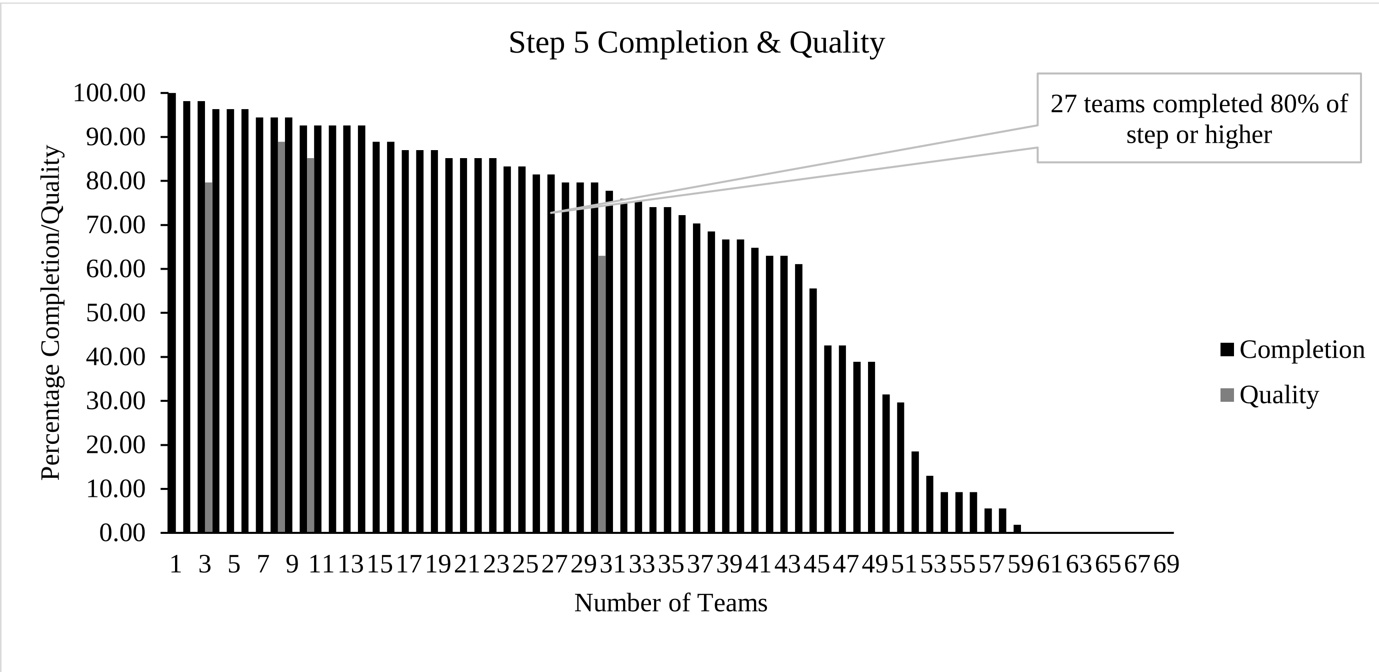


Panel D



Appendix 25**.** *FABI Step Completion and Step Quality.(Panels A-E) – Cont't*

Panel E



Note: Teams sorted by step completion followed by step quality following pair-wise deletion of composite scores.